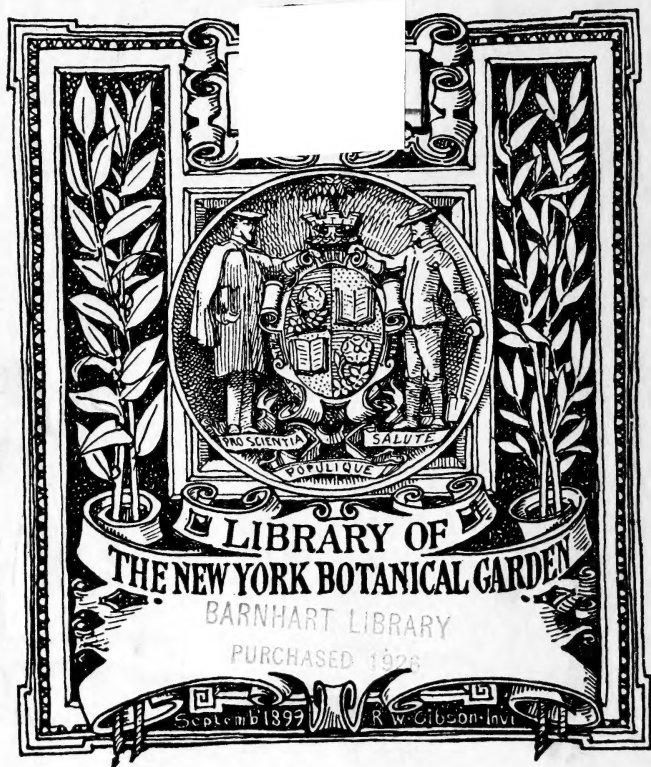


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Native Grasses
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Kansas



K. B. Allen

NATIVE GRASSES OF KANSAS.

THE NATIVE GRASSES OF KANSAS.

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I. INTRODUCTORY.

The grasses are included in one large family or order called GRAMINEÆ. No plant is properly called a grass which is a member of any other family, though the common name may be "Knot-grass," "Rib-grass," "Sea-grass," etc. The number of species has been estimated at about six thousand, but the best agrostologists now reduce the number of well-defined species to perhaps three thousand five hundred.

Grasses are found in abundance in the tropics—exceeded there by only one other family, namely, Leguminosæ, or Pea Family. They are second in size also in the temperate zones—here exceeded by the Compositæ, or Sunflower Family. But in the arctic regions the grasses outnumber all the other families of plants.

The economic importance of the family is perhaps second to none—as will readily be believed upon enumeration of such members as Wheat, Rye, Oats, Indian Corn, forage grasses, etc.

Grasses are not likely to be confused with members of any other family, unless it be Sedges; but they are easily separated upon careful inspection. The stems of grasses are hollow (except in a few cases, as Indian Corn) and round, whereas the Sedge stem is solid, and more or less three-cornered. The leaves of grasses are arranged in two vertical rows or planes—of Sedges, in three such planes. The sheath of the grass-leaf is split down the entire length, but in the sedge-leaf the two edges are united for some distance above the joint; there are a few exceptions, but the statements are true for all Kansas Grasses. The flower-cluster of the Sedge is a more or less dense spike; that of a Grass may be a spike, but in the great majority of cases it is a more open and branched cluster. The flowers of the two families are also different, but these are more difficult to understand.

In order to identify grasses satisfactorily their more obvious characters must be carefully examined, and these will therefore be here briefly passed in review, and the technical terms necessarily used in describing the various kinds explained.

THE ROOT.—Grasses have in most cases very many slender fibrous roots. They are especially abundant, long and spreading in the annual species. They are sometimes found also at the lower nodes of the stem piercing the leaf-sheath. The slender under-ground runners possessed by many perennial species, though often somewhat root-like in appearance have nevertheless nodes (joints), minute scales, which are modified leaves, and buds; these characters identify them as branches; they are the so-called *root-stocks*.

THE STEM.—The upright, (usually) hollow, jointed stem is universally designated by the word *culm*, and needs no farther characterization. The under-ground, creeping stems are the *root-stocks*, or *rhizomes*. The axis or stem which supports the flowers of a spikelet and the common axis of a close spike or panicle, is called the *rachis*.

THE LEAF.—The leaf consists of three parts, namely, a blade, a sheath and a small erect outgrowth at the juncture of the two, called the *ligule*. The leaf is

elongated, and the veins or ribs are parallel with each other and extend the entire length. The sheath completely surrounds the stem but the edges are usually free, *i. e.*, not united to each other.

THE FLOWER CLUSTER.—The flower cluster may be in the form of a dense or loose *spike*, or it may be more branching and open, in which case it is called a *panicle*.

THE SPIKELET.—The small isolated clusters of the panicle, or the separate portions of the spike, are called *spikelets*.

THE OUTER GLUMES.—If a spikelet be examined, there will be found on opposite sides at its base two chaffy scales or bracts that are called the *outer glumes* or *empty glumes*. The outer glumes may be equal or unequal or longer or shorter than the spikelet; occasionally one is extremely small or wanting.

THE FLOWER.—Above the outer glumes, and subtended by them, are the so-called *flowers*, sometimes one only but oftener two or more in each spikelet. Each flower has two bract-like or chaffy parts and other organs as explained below.

THE FLOWERING GLUME AND PALET.—The lower and larger chaffy part of the "flower" which is usually like the outer glumes in texture, is called the *flowering glume*; the other one is usually more delicate, whitish (hyaline), more or less inclosed by the flowering glume, and has in (nearly) all cases two conspicuous nerves; it is folded in such a way as to make two keels or sharp angles extending from top to bottom; this part is called the *palet*.

THE STAMENS AND PISTIL.—Within the palet and flowering glume are found the *stamens* (usually three, but sometimes one to six or even many.) In the center of the flower is the *pistil* the lower part of which is the grain. The very small bodies (called by the botanists "*Lodicules*") usually two in number (but often entirely absent) placed within the glume and palet represent the perianth, and need not be heeded except by the specialist.

The most of the grasses enumerated below were reported by Jas. H. Carruth in his catalogue of Kansas plants published in the Transactions of the Kansas Academy of Sciences in 1876. Many others have since been reported by various collectors. Some that are given have not yet been, but are likely to be found in the State. A full and reliable catalogue of Kansas grasses is yet a desideratum.

The descriptions of the grasses have been compiled from the various publications of Vasey, Scribner, Gray and other botanists. In identifying the species the plates will doubtless be found of great advantage in connection with the descriptions. Dr. Vasey's pamphlet, *The Agricultural Grasses of the United States*, contains descriptions and plates of our commonest species. The *Grasses and Forage Plants of Nebraska*, published in the Report of the State Board of Agriculture, by Dr. Chas. E. Bessey, gives many plants that grow also in Kansas. The 20 plates there given have by the kindness of the author, been here reproduced, and an equal number added which were obtained from the United States Department of Agriculture. The plates of Munroa, Schedonnardus, and Spikelets of Eatonia were published by F. Lamson Scribner in the Transactions of the Academy of Science, 1883-4; the arrangement of genera is that of E. Hackel.

II. KANSAS GRASSES.

TRIPSACUM, L.—A very small genus of grasses that have stout, tall and solid culms, and very thick creeping root-stocks. The flowers are in jointed spikes, the upper ones male (staminate), and the lower ones female (pistillate). The staminate spikelets are sessile in pairs at each joint of the triangular rachis; each spikelet contains two membranaceous male flowers, the outer glumes being coriaceous or rigid. The pistillate spikelets are single and embedded in the joints of the thickened cartilaginous rachis, two-flowered, the upper flower perfect, the lower neutral, the outer empty glume being thickened and cartilaginous and the inner much thinner and pointed; the flowering glumes are thin and scarious.

1. GAMA-GRASS; SESAME-GRASS; *Tripsacum dactyloides*, L.—A very tall perennial grass, having solid culms from thick creeping root-stocks, broad flat leaves, and peculiar flowers as described above. If cut early, it might be valuable for hay, as it is said to be nutritious, which has been confirmed by chemical analysis. (Plate No. 1.)

ANDROPOGON, L.—This large genus contains perennial grasses mostly with tall, tough and wiry stems. The flowers are loosely panicleate or the spikes are terminal or lateral, and mostly clustered. The spikelets are in pairs (or in threes) on the rachis, one being sessile and fertile, and the other pedicelled and sterile. The fertile spikelet has two somewhat coriaceous glumes, a third hyaline empty glume, and a fourth (a flowering) hyaline empty and awned glume. The sterile spikelet is similar but unawned and with or without stamens. The palea is small and hyaline or wanting.

2. BROOM GRASS; *Andropogon tener*, Kunth.—This species has slender culms two or three feet high. The peduncle is solitary, bearing a single spike, which is smooth except the joints bearded at the base. Rare, if occurring at all, in the State.

3. LITTLE BLUE-STEM; WOOD GRASS; BROOM GRASS; *Andropogon scoparius*, Mx. This showy grass grows from two to three feet high, the flowering spikes coming out in small clusters from many joints on slender pedicels, and silky with dull white hairs shorter than the flowers. It contributes somewhat to the native forage and yields a fair amount of hay. (Plate No. 3.)

4. HEAVY-TOPPED BROOM GRASS; *Andropogon macrourus*, Mx.—The culms are 2 to 3 (or even 4 to 5) feet high, bushy branched at the summit, loaded with numerous flower-spikes which form leafy clusters. The awns are long. This species is rare if occurring at all in the State, and is not known to be of agricultural value.

5. BIG BLUE-STEM; BROOM GRASS; *Andropogon provincialis*, Lam.—A tall grass 3 to 6 (or even 7 or 8) feet high. The culms (and sometimes also lateral branches) are terminated by 3 to 6 short-bearded spikes. A valuable species and extensively cut for hay. (Plate No. 5.)

6. HALL'S BROOM GRASS; *Andropogon Hallii*, Hack.—Like the last but less tall and stouter, the culms and leaves glaucous (i. e., covered with a whitish bloom), the leaves shorter and stiffer, and the spikes thicker. Seen in the southwestern portion of the State, but not abundant.

7. BROOM GRASS; *Andropogon saccharioides*, Swz.—The glaucous stems are slender, and 2 to 4 feet high; the spikes are in pairs (or fours) densely flowered and very silky, with long bright white hairs. There are several varieties, ours being var. *Torreyanus*, Hack. Distributed widely over the prairies in the western part of the State, but not abundant.

8. BROOM GRASS; *Andropogon Virginicus*, L.—This species is also tall, but easily distinguished by its long (1 to 2 feet), narrow, leafy panicle, composed of numerous lateral branches from the upper joints—the branches several times divided, and partly inclosed in the leaf-sheath. The awns are 3 or 4 times as long as the glumes. It is widely distributed in the East, and may occur (as reported) in Kansas. Not known to be valuable.

9. WOOD GRASS; INDIAN GRASS; BUSHY BLUE-STEM; *Andropogon nutans*, L.—(The generic name used formerly was *Chrysopogon* or *Sorghum*).—A tall perennial grass, with a narrow panicle of showy straw-colored flowers. It is less abundant than Blue-stem, but cut for hay when occurring in quantity. (Plate No. 9.)

PASPALUM, L.—A large genus, mostly tropical and of little agricultural value. The spikelets have each one terminal perfect flower in one or two rows along one side of the solitary or panicleate spikes. The two outer glumes are membranous and equal, or in a few species one is smaller or disappears. The more or less concave flowering glumes become indurated and embrace the palea, which is of similar texture.

10. PASPALUM; *Paspalum virgatum*, L.—The culms are decumbent, 1 to 2 feet high. The leaves are broad-linear, rough-edged, 12 to 18 inches long and 5 to 6

lines wide; the sheaths are glabrous, the throat hairy. The spikes are 7 to 12 in number. The spikelets are 4-rowed, dense, orbicular and obtuse. Grows farther south, but may occur in Kansas; it is not known to be important.

11. MARSH PASPALUM; *Paspalum fluitans*, Kunth.—An annual smooth grass, growing in wet places; the leaves are lanceolate, flat, 3 to 8 lines wide; the numerous spikes form a raceme. The grass is agriculturally unimportant.

12. SLENDER PASPALUM; *Paspalum setaceum*, Mx.—A perennial grass, ascending or decumbent, 1 to 2 feet long; the leaves are about 2 lines wide and the sheath, clothed with long, soft spreading hairs. The spikes are mostly solitary on a long peduncle, (spikelets $\frac{1}{2}$ line wide), also 1 from each of the sheaths of the upper leaves. This grass forms but a small portion of the native forage. (Plate No. 12.)

13. SMOOTH PASPALUM; *Paspalum laeve*, Mx.—This grows from 2 to 4 feet high, and bears large, long leaves, which are smooth, or nearly so. The spikes at the top of the culm are 3 to 5 in number and the spikelets are broadly 2-rowed, and over 1 line wide. This grass is said to be valuable in the South, though here it is but little more important than the preceding.

ERIOCHLOA, H. B. K.—A small genus of grasses, with spikelets nearly sessile in 1 or 2 rows along one side of the slender branches of a simple panicle. The spikelets have one perfect flower, and two empty hairy, nearly equal outer glumes. There is a peculiar swelling of the pedicel just below the spikelet. The perfect flower is much as in *Paspalum*, the flowering glume being obtuse, and sometimes pointed.

14. *Eriochloa punctata*, Hamilt.—A perennial grass, with stem erect, and pubescent above; the nodes also pubescent. The panicle is 4 to 6 inches long, consisting of 6 to 15 alternate spikes, which are $\frac{1}{2}$ to 1 inch long. This species is unimportant except as contributing slightly to the native forage in the southwestern portion of the State.

PANICUM, L.—A large genus, about 50 of which are American. They are, however, of no great value. The spikelets are in panicles, racemes or spikes, and have one perfect terminal flower and usually a second male or rudimentary one below. There are two outer empty glumes, one smaller than the other, often very small or even wanting. The glume and pale of the terminal flower are usually of a coriaceous texture and obtuse. The stigmas are usually purple.

15. SMOOTH PANIC-GRASS; *Panicum glabrum*, Gaud.—This is an annual grass sparingly introduced from Europe, but of no agricultural value. It has culms 5 to 12 inches long, bearing 2 to 6 widely diverging spikes. The upper glume equals the flower.

16. CRAB-GRASS; FINGER-GRASS; *Panicum sanguinale*, L.—This species differs from the preceding in having the upper glume but half the length of the flower and the culms (1 to 2 feet high) bearing 4 to 14 spikes. It is an introduced annual and very abundant as well as troublesome in carelessly cultivated ground—said to be valuable in the South. (Plate No. 16.)

17. TWO-EDGED PANIC-GRASS; *Panicum anceps*, Mx.—A perennial grass with a flattish, erect stem, 2 to 4 feet high, and smooth leaves a foot or more long. The panicle is 6 to 12 inches long, the spikelets about $1\frac{1}{2}$ lines. It grows in neglected or poor land and cannot be considered valuable.

18. RED-TOP PANIC-GRASS; *Panicum agrostoides*, Spreng.—The very smooth and flattish culms are 4 to 6 feet high, the reddish panicles (at least the terminal one) 6 to 2 inches long; the spikelets are a little shorter than in the preceding. It is a perennial grass usually growing in clumps in wet land. The leaves are large and abundant. The grass yields fair hay if cut before flowering-time.

19. BRANCHING PANIC-GRASS; *Panicum proliferum*, Lam.—A vigorous, stout, annual grass with thickish, succulent, spreading, rooting at the lower joints, and ascending culms and many panicles. The sheaths are flattened and the ligule ciliate.

The spikelets are pale green (or rarely purplish) and about 1 line long. This grass grows in low or wet places. Cattle and horses are very fond of it—which can be said of scarcely any other species of the genus. (Plate No. 19.)

20. OLD WITCH-GRASS; HAIR-STALKED PANIC-GRASS; *Panicum capillare*, L.—An annual grass 6 inches to 2 feet high, bearing a large terminal panicle with long slender branches. The leaves and sheaths are usually covered with long spreading hairs. It is abundant on cultivated ground late in the season. It is not only a worthless grass, but also a pestiferous weed. (Plate No. 20.)

21. FALL PANIC-GRASS; *Panicum autumnale*, Bosc.—This has a panicle like depauperate forms of the last species. The lower sheaths and margins of the small narrow leaves are more or less hairy, but otherwise the plant is smooth, except some bristly hairs in the axils of the branches of the panicle. It is not abundant nor important.

22. SWITCH GRASS; TALL PANIC-GRASS; *Panicum virgatum*, L.—A tall perennial grass, growing in clumps. The culms are erect, firm and unbranched. The leaves are 1 to 2 feet long, and rough on the margin. The panicle is diffuse, rather pyramidal, $\frac{1}{2}$ to 2 feet long, and the spikelets are ovate, pointed and about 2 lines in length. The sterile flower, unlike all the preceding species of the genus, is staminate. This grass contributes somewhat to the native forage. It makes tolerable hay only when cut young. (Plate No. 22.)

23. BROAD-LEAVED PANIC-GRASS; *Panicum latifolium*, L.—The culm is 1 to 2 feet high; the leaves are broadly oblong-lanceolate from a heart-clasping base, 11 to 15-nerved, smooth except some soft hairs at the throat or margins of the sheaths and at the joints. The panicle is small, (about 2 or 3 inches long,) and the spikelets $1\frac{1}{2}$ lines long. It grows in protected and moist places, but is not abundant.

24. PANIC-GRASS; *Panicum clandestinum*, L.—Much like the last, but the joints naked, and the sheaths rough with papillæ bearing very stiff and spreading bristly hairs. More common than the last, but of inconsiderable value.

25. PANIC-GRASS; *Panicum microcarpon*, Muhl.—Much like *Panicum latifolium*, but the leaves not dilated at the rounded, bristly ciliate base; they are also very rough-margined and roughish above. The panicle is 3 to 7 inches long, and the spikelets only $\frac{1}{2}$ line.

26. PANIC-GRASS; *Panicum xanthophyllum*, Gr.—This grass grows 9 to 15 inches high, has hairy sheaths and lanceolate pointed leaves, which are clasping and ciliate (but not dilated) at the base, otherwise smooth except the margins. The panicle is long peduncled, and very simple. Rare and unimportant.

27. PANIC-GRASS; *Panicum viscidum*, Ell.—In this the culms are upright or ascending, at length much branched and leafy to the top. The culms and sheaths are densely velvety all over—except a ring below each joint—with reflexed soft hairs. In other characters much like the three preceding species.

28. PANIC-GRASS; *Panicum scoparium*, Lam.—The culms are roughish, 1 to 2 feet high, at length much branched and reclining. The lanceolate leaves are faintly 9-nerved, hairy or smooth, and fringed on the margin (at least next the base), with long and stiff spreading hairs; the sheaths also are bristly. The panicle is open and nearly simple. Not an important grass.

29. PANIC-GRASS; *Panicum dichotomum*, L.—This is a very variable as well as unimportant grass, having culms 8 to 20 inches high. The panicle is compound, 1 to 3 inches long. The spikelets are $\frac{1}{2}$ to nearly 1 line in length.

30. PANIC-GRASS; *Panicum depauperatum*, Muhl.—The culms in this species form close tufts 6 to 12 inches high, and bear a simple and few-flowered, contracted panicle, often overtopped by the narrowly linear (4 to 7 inches long) upper leaves. The spikelets are $\frac{3}{4}$ to $1\frac{1}{2}$ lines in length. Unimportant.

31. BARN-YARD GRASS; *Panicum Crus-galli*, L.—This is an introduced annual, growing in manured soil, in ditches, etc., appearing as if indigenous. The culms are stout, and branching from the base, 1 to 4 feet high. The leaves are half an inch or more in width, and rough-margined. The spikes are alternate, 1 to 3 inches long, and crowded in a dense panicle. There are several varieties, the bearded one being common. It is here considered a weed, though said to be of value in the South. (Plate No. 31.)

32. PANIC GRASS; *Panicum colonum*, L.—This resembles small and smooth forms of the last, but it has the spikes or branches of the slender panicle entirely simple and unbranched, while in the other species they are more or less compound. The perfect flower is much less pointed. Possibly occurring in the State, but of no value.

SETARIA, Beauv.—A small genus of annuals with flowers of the same structure as in *Panicum*. The flowering glume and palet are indurated and striate. The spikelets form a cylindrical or elongated spike-like, or sometimes interrupted panicle. Below the spikelets are one to several bristles or stiff hairs, which are supposed to be abortive branchlets, and which remain after the spikelets fall away.

33. FOX-TAIL GRASS; *Setaria verticillata*, Beauv.—In this species the bristles are roughened or barbed downwards, but in the two following they are roughened or barbed upwards. The spike is 2 or 3 inches long, pale green, and composed of apparently whorled clusters; the bristles are short. It is naturalized from Europe, and found sparingly around dwellings. Of no known agricultural value.

34. YELLOW FOX-TAIL; PIGEON-GRASS; BOTTLE-GRASS; *Setaria glauca*, Beauv.—An introduced annual, about 2 feet high. The spike-like panicle is of a tawny-yellow when mature. The perfect flower is transversely wrinkled. The seeds furnish poultry food. It yields some fodder which analysis shows to be as nutritious as Hungarian grass; but on the whole it is usually considered a mere weed.

35. GREEN FOX-TAIL; PIGEON-GRASS; BOTTLE-GRASS; *Setaria viridis*, Beauv.—Like the preceding in character and structure, but the spike is green, the bristles few, the grains small and pointed and less distinctly wrinkled.

CENCHRUS, L.—A small genus of worthless and troublesome grasses, with spikelets as in *Panicum*, but inclosed 1 to 3 together in a thick, very prickly involucre or bur, arranged in an oblong or cylindrical panicle.

36. SAND-BUR; BUR GRASS; HEDGEHOG GRASS; *Cenchrus tribuloides*, L.—This too well-known grass, more abundant in sandy soil, and flourishing in neglected ground, grows from one to two feet high and produces an abundant crop of most troublesome, long-prickled burs, which adhere tenaciously to the bodies of animals, especially of sheep. It is an annual, and can be easily eradicated if removed before the seed matures.

ZIZANIA, L.—A very small genus of large aquatic grasses. The flowers are in large diffuse, monocious panicles. The spikelets are one-flowered, and consist of 2 membranous scales (glumes or palets) the lower glumes being absent or reduced to a cup-like ring. There are 6 stamens. The lower scale or glume is, in the fertile spikelets, tipped with a straight awn.

37. WILD RICE; INDIAN RICE; WATER OATS; *Zizania aquatica*, L.—This species grows in swamps or in water, and attains a height of 5 to 10 feet. It has thick spongy stems, and many large broad leaves. The grain is nutritious, and cattle are said to be fond of the grass.

LEERSIA, Swartz.—A small genus of unimportant marsh grasses, with rough leaves and sheaths, and flowers in one-sided panicked spikes or racemes. The spikelets are one-flowered, with two strongly compressed chartaceous scales (glumes or palets); these are awnless, bristly ciliate on the keels, the lower one much shorter, and inclosing the seed. The stamens are 1 to 6 in number, the stigmas 2, and the grain flattened.

38. WHITE GRASS; *Leersia Virginica*, Willd.—This pale-green grass grows in moist or wet places, has decumbent stems, leaves rough upward, a simple panicle, narrowly oblong spikelets ($1\frac{1}{2}$ lines long) and 2 stamens. Sometimes cut for hay, but unimportant.

39. CUT-GRASS; WHITE GRASS; FALSE RICE; *Leersia oryzoides*, Swz.—Like the preceding, but panicle branched and larger (1 foot long), spikelets larger ($2\frac{1}{2}$ to 3 lines long), and stamens 3. Grows in very wet places.

40. FLY-CATCH GRASS; WHITE GRASS; *Leersia lenticularis*, Mx.—Differs from the 2 preceding in having broadly oval spikelets ($2\frac{1}{2}$ to 3 lines long). Stamens 2. Grows in low ground, but very rare.

PHALARIS, L.—A small genus, one species furnishing the canary-seed of commerce, otherwise unimportant. The spikelets are one-flowered, compressed and densely crowded in an ovoid or cylindrical spike, or on the densely flowered branches of a panicle. The outer glumes are acute, boat-shaped, becoming coriaceous or cartilaginous. Within these are the two flowering glumes, sometimes called palets. Below the flower is one or sometimes two small scales or bristles, which are considered abortive glumes.

41. CANARY GRASS; *Phalaris Canariensis*, L.—An introduced annual, 1 to 2 feet high, with a panicle that is spike-like and oval. It furnishes the canary-seed of commerce.

42. SOUTHERN REED-CANARY-GRASS; GILBERT'S RELIEF-GRASS; STEWART'S CANARY-GRASS; CALIFORNIA TIMOTHY; *Phalaris intermedia*, Bosc.—This species resembles the preceding, but is taller and more robust, 1 to 3 feet high, erect, with broad, linear leaves 4 to 10 inches long. The spike is oblong or oval, compact, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long. In the variety *angustata*, Chapm., the spike is cylindrical, 2 to 4 inches long, somewhat interrupted at base. This grass has been reported in southeastern Kansas; it is abundant in the Southern and Southwestern States, and regarded there as very valuable for hay and as a winter grass.

43. REED CANARY-GRASS; *Phalaris arundinacea*, L.—A perennial grass, 2 to 5 feet high, growing in low or wet ground. It has a panicle 2 to 4 inches long, narrow and spike-like—the branches slightly spreading when in flower. It is not known to be a useful grass. (Plate No. 43.)

ANTHOXANTHUM, L.—A very small genus of grasses with a somewhat spiked panicle. The spikelets are 1-flowered, with two pairs of empty glumes. The first or lowest glume is half as long as the second; the third and fourth (second pair) are much shorter, thin, two-lobed, pubescent, and awned on the back; the fifth and sixth glumes are still smaller, the fifth being broad and 3-nerved, and the sixth narrow, hyaline, and 1-nerved.

44. SWEET VERNAL-GRASS; *Anthoxanthum odoratum*, L.—The culms are a foot or 18 inches high, the panicle 2 or 3 inches long, narrow and close, but expanding during flowering-time. It is a fragrant perennial grass, naturalized from Europe, and sometimes used as a lawn grass; occasionally found in meadows in Eastern States. It grows thinly on the ground, has few leaves, and is therefore not valuable for hay.

ARISTIDA, L.—This genus contains many species, but they are mostly annuals, and of little value. The panicle is spike-like or open and branching. The spikelets are 1-flowered, and generally have filiform pedicels. The outer glumes are unequal, and often bristle pointed. The flowering glume is narrow, rolled around the flower and terminated with a triple awn, or apparently 3 awns. The palet is small and thin.

45. TRIPLE-AWNED GRASS; *Aristida ramosissima*, Engl.—The culms are diffusely much branched. The outer glumes are 9 or 10 lines long. The middle awn is 1 inch long, and soon abruptly hooked-recurved; the lateral ones are hardly 2 lines long. This (worthless) grass occurs in Missouri, and may be found in southeastern Kansas.

46. BEARD GRASS; THREE-AWNED GRASS; *Aristida dichotoma*, Mx.—A low branching grass. The outer glumes are 3 or 4 lines long. The lateral awns are small,

and the middle one is soon reflexed and about the length of the palet. An inferior grass.

47. BEARD GRASS; THREE-AWNED GRASS; *Aristida gracilis*, Ell.—The culms are erect, 6 to 18 inches high, and naked above. Outer glumes as in the last. The exerted lateral awns (6 to 7 lines) are from $\frac{1}{3}$ to $\frac{1}{2}$ the length of the horizontally-bent middle one. A worthless grass.

48. BEARD GRASS; THREE-AWNED GRASS; *Aristida stricta*, Mx.—The culms are 2 to 3 feet high, and densely tufted, from a perennial root, bearing a long (1 foot) spiked panicle. The awns in this and all the species following are diverging and alike; they are about the length of the flower (6 lines), or the lateral ones a third shorter. A worthless grass.

49. BEARD GRASS; TRIPLE-AWNED GRASS; *Aristida purpurea*, Nutt.—The culms are erect, slender, 6 to 15 inches high, bearing a purplish, loose-flowered panicle, 3 to 6 inches long. The awns are 1 to 2 lines long. In the var. *longiseta*, Vasey, the awns are very long (1 to 3 inches). Another var. (*filipendula*) differs from the latter in its rather more closely flowered panicle, smaller spikelets, and shorter awns. This is abundant on the plains, and contributes somewhat to the native forage. (Plate No. 49.)

50. BEARD GRASS; TRIPLE-AWNED GRASS; *Aristida desmantha*, Trin.—The erect culms are about 2 feet high and branching. The panicle is about 6 inches long with branches in pairs and erect-spreading, but fasciated at the top. The awns are about 1 inch long, separating by an articulation below the junction. Not valuable.

51. BEARD GRASS; TRIPLE-AWNED GRASS; *Aristida oligantha*, Mx.—In this species the culms are 6 inches to 1 foot or more in length, bearing a loosely few-flowered raceme. The capillary awns are $1\frac{1}{2}$ to 3 inches long. In value like the last.

52. TALL BEARD GRASS; TRIPLE-AWNED GRASS; *Aristida purpurascens*, Poir.—The culms are slender, smooth, and usually 2 feet or more in height. The flowers are in a long (10 to 18 inches) spiked panicle. The awns are much longer than the flower—the middle one about 1 inch long. Not a valuable grass.

STIPA, L.—A genus of mostly western, coarse, rigid perennial grasses. The spikelets are 1-flowered, cylindrical, and spicate or paniculate. The outer glumes are membranaceous and keeled. The flowering glume is narrow, coriaceous, rigid, and involute, with a simple twisted awn at the apex. The palet is usually small and inclosed by the flowering glume. There is, at the base of the flowering glume, a hardened and bearded pedicel or stipe.

53. BLACK OAT-GRASS; *Stipa avenacea*, L.—The slender culms are 1 to 3 feet high, with an open panicle; the leaves are almost bristle-form. The flowering glumes are blackish and nearly as long as the outer glumes (about 4 lines long). It occurs rarely, if at all, within the eastern portion of our State, and is of no value.

54. PORCUPINE-GRASS; FEATHER GRASS; *Stipa comata*, Trin. & Rupr.—The culms are stout and from 1 to 4 feet high. The panicle is loose and open, 8 to 12 inches long. The awns are 4 to 6 inches long, rough, variously curled and twisted when mature. They give trouble to stockmen on account of injury done to sheep, the awns penetrating the wool and often the flesh.

55. PORCUPINE-GRASS; FEATHER GRASS; *Stipa spartea*, Trin.—Like the preceding, but the panicle is narrow and contracted, the callus (base of flowering glume or grain) more pointed and densely bearded (when mature). This species is more abundant than the preceding, which is found only in the western portion of the State.

ORYZOPSIS, Mx.—A small genus of perennial grasses with rigid leaves, and a narrow raceme or panicle. The spikelets are one-flowered and nearly cylindrical. This genus differs from *Stipa* in the shorter and broader flowering glume. The usually short awn is slender, twisted, and very deciduous.

56. MOUNTAIN RICE; *Oryzopsis melanocarpa*, Muhl.—The culms are 2 or 3 feet

high, the panicle simple or sparingly branched, and the awn three times the length of the blackish flowering glumes. Not known to be valuable.

MUHLENBERGIA, Schreb.—A large genus, mostly American species, and usually perennial. It has small one-flowered spikelets, generally in open panicles. The outer glumes are variable in size, sometimes bristle-pointed, keeled, persistent, thin. The flowering glume is 3 to 5-nerved, pointed or awned, and frequently pubescent below. The palet is about as long as the flowering glume, and of similar texture.

57. MUHLENBERGIA; *Muhlenbergia sobolifera*, Trin.—The culms in this and the following species are from 1 to 3 (or even 4) feet high. They are to be separated with certainty only by an inspection of the glumes and palet, as well as the panicle. In this species the panicle is simple, contracted and very slender or filiform. The outer glumes are barely pointed. Not known to be a useful grass.

58. SPIKED MUHLENBERGIA; *Muhlenbergia glomerata*, Trin.—The panicle is oblong-linear and contracted into an interrupted glomerate spike. The outer glumes have a bristle or awn of about their own length. This species grows in wet or moist places, and is utilized to some extent for hay. (Plate No. 58.)

59. WOOD GRASS; MEXICAN MUHLENBERGIA; *Muhlenbergia Mexicana*, Trin.—A very much branching grass. The panicles are lateral and terminal, narrow, usually 2 or 3 inches long, and composed of 5 to 10 spike-like branches. The glumes are acute or abruptly short-pointed. In the variety *filiformis* (Muhl.) the panicles are more slender. It grows in low places, and yields considerable forage. (Plate No. 59.)

60. WOOD GRASS; *Muhlenbergia sylvatica*, T. & G.—Much like the last, but the panicle is looser, and the flowering glume bears an awn 2 or 3 times longer than itself. It grows in drier places than the last, and is of equal value.

61. WOOLY-SEEDED MUHLENBERGIA; *Muhlenbergia comata*, Benth.—Closely related to the last species, but has a soft panicle, generally of a purplish lead color, and a surrounding tuft of hairs at the base of the flowering glume. Grows only in the West, and said to be a promising grass.

62. WILLDENOW'S MUHLENBERGIA; *Muhlenbergia Willdenovii*, Trin.—The culms are simple or sparingly branched. The contracted panicle is slender and loosely flowered. The outer glumes are half the length of the flowering one, which bears an awn 3 or 4 times the length of the spikelet. Contributes somewhat to the native forage.

63. NIMBLE WILL; WIRE GRASS; *Muhlenbergia diffusa*, Schr.—This is low and much branched, and bears slender panicles loosely many-flowered. The outer glumes are extremely minute, and the flowering glume little more than a line long and tipped with a fine awn or beard once or twice its own length. Grows in protected places, and furnishes a valuable portion of the native forage.

64. HAIR GRASS; *Muhlenbergia capillaris*, Kunth.—This differs from all the preceding species in having a very loose and open (purplish) panicle (6 to 20 inches long) with long and capillary branches. The pedicels are 1 to 2 inches long and scarcely thicker than the awns, which are an inch long. Not known to be a valuable grass.

BRACHYELYTRUM, Beauv.—A very small genus having one species and one variety in this country, both perennial. The panicle is simple and racemose; the spikelets have one flower and a sterile rudiment; the outer glumes are minute, persistent, unequal, the upper larger and about a half-line long. The flowering glume is chartaceous, ending in an awn 8 or 10 lines long. The palet is hyaline, 2-keeled, and bifid at the apex; the rudiment is bristle-like, half as long as the palet and partly lodged in the groove on its back.

65. SHORT-GLUMED GRASS; *Brachyelytrum aristatum*, Beauv.—A perennial grass, with stems 1 to 3 feet high from creeping root-stocks; downy sheaths, and broad, flat leaves. Not known to be valuable.

PHLEUM, L.—A small genus of annual and perennial grasses, with the flowers crowded into a dense, harsh spike. The spikelets are one-flowered in small clusters. The outer glumes are one-nerved and mucronate, or short awned. The flowering glume is membranaceous, shorter and broader than the outer glumes. The palet is hyaline and narrow.

66. TIMOTHY; HERD'S GRASS; CAT'S-TAIL GRASS; *Phleum pratense*, L.—This introduced grass, (but apparently also indigenous,) with its simple, erect stems and elongated, cylindrical, dense spike, is easy of recognition. It is so well known as to need no further description. It is one of the most valuable of all our grasses. (Plate No. 66.)

ALOPECURUS, L.—A small genus of grasses, a few inches to 2 or 3 feet high, having the flowers crowded into a cylindrical dense spike. The spikelets are one-flowered, and have the outer glumes strongly compressed, boat-shaped, keeled, nearly equal and frequently united at the base. The flowering glume is shorter, keeled, and furnished with a slender awn on the back. The palet is absent.

67. ALPINE FOX-TAIL; *Alopecurus alpinus*, Sw.—A perennial grass, with smooth erect stems, 6 inches to a foot high. The outer glumes are covered on the back with long dense white hairs. Not valuable, and perhaps not occurring in the State.

68. MEADOW FOX-TAIL; *Alopecurus pratensis*, L.—The culm is upright, smooth, and about 2 feet high. The flowering glume equals the outer glume. The awn is from Europe, and frequently found in meadows, especially in the Eastern States.

69. WATER FOX-TAIL; *Alopecurus geniculatus*, L.—The stems are ascending, and bent at the lower joints. The flowering glume is rather shorter than the outer glume; the awn from near its base projects half its length beyond. It grows in wet places, and contributes but slightly to the native forage.

70. SHORT-BEARDED FOX-TAIL; *Alopecurus aristulatus*, Mx.—Similar to the last, but easily distinguished by the glaucous stems and short awn, which scarcely exceeds the palet.

SPOROBOLUS, R. Br.—A genus (including also the old genus *Vilfa*) of annual and perennial grasses with the one to two-flowered spikelets in a contracted or open panicle. The outer glumes are unequal, the lower one shorter, often acute, unawned, one to three-nerved and membranaceous. The flowering glume is mostly longer and unawned. The palet is prominently two-nerved, of the same texture as the flowering glume, and about equaling it.

71. SMUT GRASS; *Sporobolus Indicus*, R. Br.—This grass grows in tufts or loose patches, is $1\frac{1}{2}$ to 3 feet high, has many long, flat, fine-pointed leaves, and a terminal panicle (sometimes a foot long) which is composed of short, erect, closely-flowered branches. The spikelets are less than a line long. This grass is a native of India, and very abundant further south. It is supposed to be a grass of some value.

72. ROUGH DROP-SEED GRASS; *Sporobolus asper*, Kunth.—A perennial, tufted grass, 2 to 4 feet high. The leaves are very long, rigid, rough on the edges, and tapering to a long thread-like point. The sheaths at first partly or wholly inclose the contracted panicle. The spikelets are 2 to 3 lines long. Not an important grass.

73. DROP-SEED GRASS; *Sporobolus vaginæflorus*, Torr.—This small (6 to 12 inches high) annual has narrow leaves and single or spiked panicles—the lateral ones (and often the terminal one) inclosed in the sheaths. It is not abundant enough to be important.

74. DROP-SEED GRASS; *Sporobolus cuspidatus*, Torr.—This grass is perennial, has very narrow stems and leaves, and a very simple, narrow, exserted panicle. The outer glumes are very acute, and the flowering one cuspidate. Grows farther north, but reported also in Kansas. Perhaps not valuable.

75. DROP-SEED GRASS; *Sporobolus depauperatus*, Torr.—A variable tufted grass, 3 inches to 2 feet long, often much branched. The panicle is $\frac{1}{2}$ to 2 inches long, very narrow, consisting of a few solitary distant rays. The outer glumes are obtuse. Not known to be important.

76. DROP-SEED GRASS; *Sporobolus heterolepis*, Gr.—The culms are $1\frac{1}{2}$ to 3 feet high, and grow in dense, firmly-rooted tufts. The root-leaves are very long and narrow. The panicle is from 3 to 8 inches long, rather narrow and loose, the branches 2 or 3 together, slender and with rather distant flowers. It is more abundant farther west, and said there to be cut for hay.

77. DROP-SEED GRASS; *Sporobolus cryptandrus*, Gr.—This stout grass grows chiefly in sandy soil. The culms are frequently bent at the lower joint, then rise erect 2 or 3 feet. The lower sheaths are short and their blades 5 to 6 inches long; the upper ones become longer but their blades shorter. The top of the sheath is fringed with soft hairs. The long (6 to 12 inches) narrow panicle is for a long time concealed, but finally emerges (except the base) and becomes spreading. The branches are flower-bearing to the base, and hairy in the axils. This grass furnishes a portion of the native forage. (Platè No. 77.)

78. SALT-GRASS; DROP-SEED GRASS; *Sporobolus airoides*, Torr.—The stems are tufted 2 or 3 feet high from perennial creeping root-stocks. The leaves are very pale, and taper to a filiform point. The sheaths have a few long hairs at the throat. The panicle is diffuse, 6 to 12 inches long and 3 to 4 inches wide, its branches naked below. It yields some pasturage.

79. DROP-SEED GRASS; *Sporobolus asperifolius*, N. & M.—The stems are 6 to 15 inches long, branched, forming broad, matted tufts. The leaves are rough on the margins and upper face. The panicle (inclosed at the base) is 3 to 5 inches long, its branches capillary and 3 to 4-flowered. Grows chiefly westward, but of no considerable value.

79½. DROP-SEED GRASS; *Sporobolus Arkansana*, (Trin.) — The culms are low ascending or erect, somewhat branched. The ligule is very short and ciliate. The leaves near the base and the sheaths have long scattered hairs, and are roughish. The panicle is pyramidal, with about 7 or 8 (or more) verticillate branches at the base and fewer above; the pedicels are very short; the glumes are acute. An uncommon grass in southwestern Kansas, and of no known value.

POLYPOGON, Desf.—A small genus of mostly annual grasses with one-flowered spikelets in a contracted, mostly spike-like panicle. The pedicels are rather clavate, and usually articulated below the glumes. The outer glumes are nearly equal, and long-awned from the apex. The flowering glume is smaller, thinner, generally hyaline, and usually prolonged at the apex into a slender awn. The palea is thin, sometimes much shorter than its glume.

80. ANNUAL BEARD-GRASS; *Polypogon Monspeliensis*, Desf.—The culms are 6 inches to 2 feet high, procumbent at base, rarely erect, often branching from below. The panicle is dense, soft, shining, yellowish-green, 2 to 6 inches long, with conspicuous long beards or awns. Ornamental, but of little value. Widely distributed, and perhaps found in Kansas.

81. PERENNIAL BEARD-GRASS; *Polypogon littoralis*, Sm.—The culms form large tufts, the panicle is narrow, much lobed its whole length, and usually purplish. The awns are short, otherwise much like the last. Reported in Kansas, but perhaps found only further west in higher altitudes.

CINNA, L.—A small genus of perennial grasses. The spikelets are much flattened, one-flowered, in an open, spreading panicle. The outer glumes are lanceolate, acute, and hispid on the strong keel, the upper somewhat longer than the lower. The flowering glume is plainly stalked above the outer glumes, about the same length, three-nerved and short-awned on the back near the apex. The palea is only one-nerved, and nearly as long as its glume. Stamen, only one.

82. WOOD REED-GRASS; *Cinna arundinacea*, L.—The culms are erect, simple, 3 to 6 feet high, with creeping root-stocks. The leaves are a foot long, 4 to 6 inches wide, and with a conspicuous elongated ligule. The panicle is 6 to 12 inches long, rather loose in flower, afterwards more close. The palea has but one nerve; only on

stamen present. It grows in wet and moist shaded places. It affords considerable forage.

There is a var. (*pendula*), usually considered a separate species, which is more slender, with a looser drooping panicle, more capillary branches and thinner glumes.

AGROSTIS, L.—A large genus of grasses, mostly perennials, usually with low culms forming dense tufts. The open panicle has one-flowered spikelets. The outer glumes are acute, 1-nerved, awnless, nearly equal or the lower rather larger and longer than the flowering glume. The latter is very thin, 3 to 5-nerved, with or without an awn on the back. The palea is shorter than the flowering glume, often a mere scale or entirely absent.

83. RED-TOP; FINE-TOP; BORDEN'S GRASS; BENT GRASS; *Agrostis vulgaris*, With.—A perennial grass, 2 or 3 feet high, from creeping and interlacing root-stocks. The panicle is oblong in outline, 4 to 6 inches long, open, composed of 8 or 10 joints or whorls. The spikelets are about a line long, varying from greenish to purple. The variety *alba* (*AGROSTIS ALBA*, L.) is distinguished by having a closer panicle and longer ligules. A valuable grass; many forms (so-called "varieties") in cultivation. (Plate No. 83.)

84. NORTHERN RED-TOP; MOUNTAIN RED-TOP; *Agrostis exarata*, Trin.—A variable grass, usually more slender than the common Red-top; the panicle is usually larger, narrower, and looser. It is pale green, rather loose, but with erect branches. In all the forms the palea is wanting or minute. This is chiefly a northern species, but a very promising grass.

85. BENT GRASS; *Agrostis elata*, Trin.—The culms are stout, 2 to 3 feet high. The ligules are 2 to 3 lines long. The spikelets ($1\frac{1}{2}$ lines long) are crowded on the branches of the spreading panicle above the middle. Not known to be valuable.

86. THIN GRASS; BENT GRASS; *Agrostis perennans*, Tuck.—The culms are slender, erect from a decumbent base, 1 to 2 feet high. The pale green at length spreading panicle has short branches, which are divided and flower-bearing from or below the middle. Grows in shaded places. Perhaps of no agricultural value.

87. HAIR GRASS; *Agrostis scabra*, Willd.—The culms are slender, 1 to 2 feet high, with leaves short and narrow. The loose purplish panicle has long capillary branches, which are flower-bearing at or near the apex. Rather abundant, and yields sometimes considerable forage.

CALAMAGROSTIS, Roth.—This large genus includes 20 or more American species which are perennial and have running root-stocks. The spikelets which form a contracted or open panicle are one-flowered, and have usually a bristle-like hairy rudiment opposite the palea. The outer glumes are nearly equal, keeled, awnless and membranaceous or scarious. The flowering glume has usually a ring of hairs surrounding the base; it is entire or 2-toothed, and usually with an awn on the back. The palea is narrow, thin, 2-nerved, and 2-keeled.

88. SMALL REED-GRASS; BLUE JOINT; *Calamagrostis Canadensis*, Beauv.—A stout, tall, erect grass, with hollow culms, 3 to 5 feet high. The leaves are a foot or more in length, from $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, and roughish—the stem and sheaths smooth. The panicle is of a purplish color, 4 to 6 (or even 8) inches long, and 2 or 3 inches in diameter; the branches are usually in fives. The awn is delicate and straight. It grows (mostly northward) in wet or low ground, and where abundant is valuable especially as a meadow-grass. (Plate No. 88.)

89. REED BENT-GRASS; *Calamagrostis confinis*, Nutt.—The culms are 2 to 5 feet high. The panicle is elongated, its branches spreading at flowering-time. The awn (borne much below the middle of the glume and surpassing it) is bent, divergent, or twisted when dry. The hairs of the flower are copious, equal, slightly shorter than the flowering. Rare, but perhaps found in the eastern counties of the State. Of no known agricultural value.

AMMOPHILA, Host.—This is a small genus, being a part of the old genus *Calamagrostis* (now *Dey-*

euxia). One of the 3 American species is found in this State. The culms are rigid, 2 to 6 feet high, and have running root-stocks. The panicle is contracted or open, and diffuse; the spikelets are one-flowered. The outer glumes are large, nearly equal, rigid, thick, lanceolate, acute, keeled, and 5-nerved. The similar flowering glume is of about the same length and sometimes mucronate at the apex. The palea is also of similar texture, as long as its glume, 2-keeled, and grooved between the keels.

90. LONG-LEAVED REED-GRASS; *Ammophila longifolia*, Vasey.—The culms are stout, 2 to 6 feet high. The leaves are long, rigid, and with a thread-like point. The panicle is 4 to 16 inches long, rather loose at first, then open and spreading. The strong running root-stocks bind the sand in which the grass grows; otherwise it is not of much value, being too coarse.

DESCHAMPSIA, Beauv.—This is a small genus, formerly included in *Aira*. The 2-flowered spikelets form a small, loose (rarely contracted) panicle with capillary branches. The outer glumes are keeled, and have scarios margins. The flowering glumes are obtuse or more or less 4-toothed, with a fine dorsal awn below the middle. The palea is prominently 2-nerved or often 2-toothed.

91. WOOD HAIR-GRASS; *Deschampsia flexuosa*, Griseb.—The slender culms are nearly naked (1 to 2 feet high) above the tufts of involute, bristle-form root-leaves (1 to 6 inches long). The awn is longer than the glume, and becomes bent and twisted. A variable species of wide distribution, and perhaps to be met with in Kansas. Not important.

92. HAIR GRASS; *Deschampsia cespitosa*, Beauv.—The tufted culms are 2 to 4 feet high. The root-leaves are 6 to 12 inches long, flat and linear. The awn is about as long as the glume. Same as the preceding as to distribution, but further west it is abundant, and in some places is an important forage grass.

DANTHONIA, DC.—A large genus of grasses. The spikelets are 3 to 5 or many-flowered in an open panicle, the rachis hairy and produced beyond the upper flower into a stipe or rudiment. The lower flower is male only, the second perfect or female. The outer glumes are keeled, very thin and acuminate. The flowering glumes are 5 to 7-nerved, that of the lower or male flower with a twisted awn attached near the base, that of the fertile flower with a short straight awn near the tip. The palea is hyaline, narrow, and two-keeled.

93. SPIKED WILD OAT-GRASS; *Danthonia spicata*, Beauv.—The culms are 1½ to 2 feet high, erect and slender. The leaves are mostly in a tuft, short and narrow. The panicle is only an inch or two long, having 4 to 7 spikelets with very short pedicels. Grows in poor land; perhaps found in Kansas, but of little or no value.

SPARTINA, Schreb.—A small genus of coarse, perennial grasses, growing mostly in marshy ground, and having long and tough leaves, and abundant scaly root-stocks. The spikelets are one-flowered, sessile along one side of the triangular rachis, or spikes, which are racemose on the panicle. The outer glumes are strongly compressed, with a rigid keel, unequal and awnless. The flowering glume is membranaceous, compressed, keeled, and awnless. The palea is two-keeled, and nearly equals its glume.

94. CORD GRASS; MARSH GRASS; *Spartina cynosuroides*, Willd.—A slender grass, 3 to 7 feet high, with narrow leaves 2 to 4 feet long, tapering to a slender point, and rough margined. It is abundant in the marshes and sloughs, and furnishes good forage and hay early in the season, becoming later harsh and worthless. It is also used in making coarse mats, for thatching, for covering hot-beds, etc. (Plate No. 94.)

95. MARSH GRASS; SALT GRASS; RUSH SALT GRASS; *Spartina juncea*, Willd.—A slender, rigid grass, 1 to 2 feet high. The leaves are rush-like, involute, and rigid. It grows in salt marshes, and makes an inferior hay.

CHLORIS, Swz.—A small genus of comparatively unimportant grasses, growing mostly in the south and southwest. The spikelets are crowded in two rows on one side of simple spikes, which are clustered near or at the upper end of the culm. The lower flower of each spikelet is perfect, the others (one or several) are imperfect. The outer glumes are thin, keeled and without awns. The flowering glumes are of thicker texture, usually awned, but sometimes obtuse. The folded palea has two prominent nerves.

96. *Chloris verticillata*, Nutt.—The culm is compressed, branched from the

base, about 12 inches high. The leaves are pale green. The filiform spikes are mostly verticillated in two series, spreading, about 6 inches long, and hairy at the base. The spikelets are awned, one-sided, and alternate in 2 rows. A curious and elegant grass, but perhaps of no agricultural value. (Plate No. 96.)

GYMNOPOGON, Beauv.—A small genus of perennial grasses. The spikelets are sessile and remotely alternate, on long and filiform branches of the panicle, each with 1 or rarely 2 perfect flowers, and a bristle-like rudiment. The outer glumes are long-lanceolate, as long as the spikelets, nearly equal, keeled and acute. The flowering-glume is cylindrical, involute, 2-toothed or lobed at the apex—having a straight, slender awn from the midrib. The palet, included in its glume, is narrow and 2-keeled. The glume of the imperfect flower also has a long awn.

97. NAKED BEARD GRASS; *Gymnopogon racemosus*, Beauv.—The wiry, leafy culms are a foot high, and clustered from a short root-stock. The slender rays or spikes of the crowded raceme (or panicle) are flower-bearing to the base. Found only in southeastern Kansas; perhaps not abundant nor valuable.

SCHEDONNARDUS, Steud.—A very small and unimportant genus. The spikelets are 1-flowered, solitary at each joint of the slender triangular rachis of the paniculate, alternate and distant spikes; each is partly immersed in an excavation. The outer glumes are acuminate, unequal, the longer equalling the flowering glume, which is linear-acuminate and thickish at the keel. The palet is shorter and thinner.

98. TEXAS SPIKE-GRASS; *Schedonnardus Texanus*, Steud.—This annual grass (formerly called *Lepturus paniculatus*) grows 6 to 20 inches high, has a panicle of slender, naked triangular spikes. Of no agricultural value.

BOUTELOUA, Lag.—There are many species of this genus, mostly perennial, and they furnish a large portion of the native forage of our State. There are generally many spikes, in a racemose one-sided panicle. The spikes are from $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, and mostly densely-flowered. The spikelets are one-sided, crowded in two rows; each consists of one perfect flower, a stalked pedicel with empty glumes and 1 to 3 stiff awns. The outer glumes are unequal, acute, keeled, and membranous. The flowering glume is broader, usually thicker, and with 3 to 5 lobes, teeth, or awns at the apex. The palet is hyaline, narrow, and enfolded by its glume.

99. BRISTLY MESQUITE; GRAMMA GRASS; *Bouteloua hirsuta*, Lag.—This grows to a height of 6 to 20 inches; has very narrow leaves. The spikes number 1 to 5, are oblong-linear, very dense, having the spikelets pectinately crowded on one side. The upper glume has bristly hairs from dark, warty glands. The sterile glume and its pedicel are not hairy. This is one of the valuable native forage grasses.

100. MESQUITE GRASS; GRAMMA GRASS; *Bouteloua oligostachya*, Torr.—This is much like the preceding, but the glumes are soft-hairy, and the pedicel of the sterile glume is copiously villous-tufted. This is not the true Buffalo Grass, though often called by that name. It is perhaps even much more valuable than that, furnishing an enormous amount of the native forage of the plains. (Plate No. 100.)

101. TALL GRAMMA GRASS; *Bouteloua racemosa*, Lag.—The tufted stems of this grow to a height of 1 to 3 feet. The spikes are $\frac{1}{2}$ inch in length or shorter, reflexed, nearly sessile, 30 to 60 in number, which form a loose general spike 8 to 15 inches long. This grass is abundant, and valuable for pasture and for hay.

ELEUSINE, Gaert.—A small genus of annual grasses, with 2 to 5 or more spikes digitate at the summit of the stem or sometimes scattering ones lower down. The spikelets are sessile and crowded along one side of the rachis; they are 2 to 6-flowered, the uppermost flowers being imperfect or rudimentary. The outer glumes are membranaceous and shorter than the spikelet. The flowering glume is usually obtuse. The palet is folded and 2-keeled.

102. YARD GRASS; CROW-FOOT; CRAB GRASS; WIRE GRASS; *Eleusine Indica*, Gaert.—An annual grass, native of tropical regions, but everywhere naturalized in temperate countries. The culms are 1 to 3 feet high, coarse and leafy, especially below. The spikes, &c., as described above. A valuable grass in the South, but here considered a weed.

LEPTOCHLOA, Beauv.—A very small genus. The spikelets are several- (rarely one-) flowered, sessile, in two rows along one side of the slender spikes or branches of the panicle. The outer glumes are keeled, awnless, or pointed. The flowering glumes are usually obtuse, prominently nerved, and awnless. The palet prominently 2-nerved.

103. FEATHER GRASS; SLENDER GRASS; *Leptochloa mucronata*, Kth.—An annual grass, 2 to 3 feet high, with flowers on a long paniced raceme (sometimes 2 feet long). The branches, or spikes, are very slender, 1 to 5 inches long, very numerous (30 to 50, or more, with the sessile spikelets, in two rows on one side). It is a handsome grass, but of no agricultural value. (Plate No. 103.)

BUCHLOE, Englm.—A single, perennial species, very small, dioecious (rarely monoecious). In the male plant the spikelets are two to three-flowered, in short, one-sided spikes. The spikes are two or three at the summit of the culm, 4 or 5 lines long, and composed of five or six spikelets. The outer glumes are unequal. The flowering glume and palet are of equal length, and membranous. In the female plant, the spikelets are in short capitate spikes, near the ground, and partly inclosed in the bract-like sheaths of the upper leaves. All the upper glumes are indurated and cohere with the thickened rachis.

104. BUFFALO GRASS; FALSE MESQUITE GRASS; *Buchloe dactyloides*, Englm.—The male plant has flowering stems, 4 to 8 inches high, bearing at the summit two to four short spikes (about $\frac{1}{2}$ inch long). The female plant has flower stems but 1 or 2, rarely 3 or 4, inches high, sometimes almost concealed among the leaves. This grass grows in extensive tufts or patches, spreading largely by stolons or offshoots, sometimes 2 feet long, with joints every three or four inches. It is spread extensively over the plains, but in our State now abundant only in the western portion. Though low (seldom more than 3 or 4 inches high) and having very small leaves, it is for the plains one of the most important pasture grasses, and its virtues are widely celebrated. (Plate No. 104.)

MUNROA, Torr.—A genus with three (American) species, one of which is found in our State. The spikelets—each about 3-flowered (upper one imperfect)—are 2 or 3, in small, leafy heads or clusters, terminating the numerous branches at the nodes. The outer glumes are hyaline, one-nerved, and shorter than the flowers. The flowering glumes are larger, herbaceous, 3-nerved, the central nerve terminating in a short awn. The palets are hyaline and 2-keeled.

105. FALSE BUFFALO GRASS; *Munroa squarrosa*, Torr.—A low, rigid, creeping, worthless annual grass, of the western plains. (Shown in Plate No. 105.)

PHRAGMITES, Trin.—A small genus of tall, stout perennials, with broad leaves and a large terminal panicle. The spikelets are 2 to many-flowered; villous at the base, and with a conspicuous silky-bearded rachis; but the lowest flower of the spikelet is male only, and glabrous. The outer glumes are narrow, unequal, glabrous, lanceolate, keeled and acute. The flowering glumes are membranaceous, slender and awn-pointed. The palets are much shorter than the glumes, 2-keeled, and pubescent on the keels.

106. REED GRASS; *Phragmites communis*, Trin.—A tall, coarse, perennial grass, reaching a height of 8 to 12 feet, and in case of prostrate (rooting) stems sometimes four times that length. The culms are sometimes nearly an inch in diameter, and the leaves are an inch or two in width. The terminal, loose, ornamental panicles are 9 to 15 inches long. The grass grows in swamp and wet places. It is good for fodder only when young. The canes have been used in places for thatching, for covering hot-beds, etc.

TRIODIA, R. Br.—A genus of grasses which has many species in the Southwest. The spikelets are many-flowered, (the upper one or more imperfect,) and form a simple or compound panicle. The outer glumes are keeled and awnless. The flowering glumes are imbricated, rounded on the back, (at least below,) and 3-nerved. The palet is broad and prominently 2-keeled.

107. TALL RED-TOP; *Triodia cuprea*, Jacq. (*T. seslerioides*, Benth.)—The culms are very smooth, 3 to 5 feet high, bearing long, flat leaves. The purplish panicle is large and loose, at first erect, but finally spreading. This is a showy, perennial

grass, rather abundant, yields good pasturage when young, and sometimes also cut for hay. (Plate No. 107.)

108. *Triodia ambigua*, Vasey.—The rigid, slender culm is 2 to 4 feet high, and the leaves are filiform. The panicle is contracted, 3 to 5 inches long. The spikelets are few, not longer, but much broader than in the preceding. It is not known to be a valuable grass.

109. *Triodia stricta*, Vasey.—The slender, firm culm is 3 to 6 feet high. The panicle is very strict, (6 inches long and $\frac{1}{2}$ inch wide,) spike-like, and close. The spikelets are flat, and nearly as broad as long. A singular but perhaps unimportant grass.

110. *Triodia acuminata*, Vasey.—This grass has simple stems, 6 inches or more in height, usually with but a single node, which bears a very short leaf. The root-leaves are an inch or two long. The panicle is dense, ovoid, 1 to 2 inches long. Not known to be abundant or valuable.

111. SAND GRASS; *Triodia purpurea*, Vasey.—The stems are tufted, 6 to 12 inches high, and have bearded joints. The panicle is very simple, consisting of but few spikelets; the terminal one is usually exserted, and the axillary ones are usually included in the hairy sheaths. It is an annual grass, of no known agricultural value.

REDFIELDIA, Vasey.—This genus contains one species, perennial, with strong, creeping root-stocks, and an elongated, lax panicle. The spikelets are ovate, compressed, 3 to 5-flowered, the base of the flowers beset with white hairs. The outer glumes are about half the length of the spikelet, ovate-lanceolate, 1-nerved, the upper a little longer and broader. The flowering glumes are thickish and rather rigid, acute or erose-lenticulate (not 3-lobed nor 3-toothed), and 3-nerved. The palea is equal to, or longer than, its glume, bidentate, folded lengthwise in the middle, and with the 2 keels prominently folded in the opposite direction.

112. *Redfieldia flexuosa*, Vasey.—The culms are flexuous, smooth, and $1\frac{1}{2}$ to 3 feet high. The leaves are rigid and slender, 1 to $1\frac{1}{2}$ feet long, and mostly near the base. The panicle is lax, half or more than half the length of the culm, its lower branches 4 to 6 inches long. This grass grows on the sand-hills in southwest Kansas.

DIPLACHNE, Beauv.—A small genus formerly included under the name *Leptochloa*. The panicle has long, slender branches on which the spikelets are irregularly scattered in two rows. The spikelets are sessile, or nearly so, many-flowered, narrow. The outer glumes are keeled, acute, and unawned. The flowering glumes are 1 to 3-nerved, with a thin or hyaline, shortly 2-lobed apex, the keel produced into a short point or awn between the lobes. The palea is thin and prominently 2-nerved.

113. SPIKE GRASS; *Diplachne fascicularis*, Beauv.—An annual grass, 2 to 3 feet high, with narrow leaves. The panicle is large, 6 to 10 inches long, consisting of fifteen to thirty spike-like branches, which are 2 to 4 inches long, angular and rough, and flower-bearing throughout. It grows in wet places and brackish marshes, and is of but little importance. (Plate No. 113.)

114. SPIKE GRASS; *Diplachne rigida*, Vasey.—This annual grass is $1\frac{1}{2}$ to 2 feet high, erect, with few leaves, which are narrow, rigid, 6 to 10 inches long, and hairy at the throat. The panicle is erect, stiff, 1 to 2 feet long, with numerous distant spreading and spike-like branches, 4 to 6 inches long. Not of any agricultural value.

ERAGROSTIS, Beauv.—A large genus of grasses with spikelets nearly like *Poa*. The panicle may be loose and spreading, or narrowed and clustered. The spikelets are several (usually many)-flowered; the rachis between the flowers usually glabrous. The outer empty glumes are keeled, one-nerved, unequal, and rather shorter than the flowering ones, which are unawned, three-nerved, the keel prominent, the lateral nerves sometimes feint. The palea is shorter than the glume, has two prominent nerves or keels, and often persists after the glume and grain have fallen.

115. CREEPING ERAGROSTIS; *Eragrostis reptans*, Nees.—A prostrate, creeping, much-branched annual, with numerous linear-lanceolate, ten to thirty-flowered, spikelets. Grows in sandy or gravelly wet places, and is of little or no agricultural value.

116. STINKING GRASS; PUNGENT MEADOW-GRASS; CANDY GRASS; *Eragrostis major*, Host.—An introduced but abundant grass in cultivated land, growing 1 to 2 feet high, the lower joints bent and giving rise to long branches. The panicle is 4 or 5 inches long, and full-flowered. The spikelets are $\frac{1}{4}$ to $\frac{1}{2}$ inch long, and ten to twenty-flowered. The disagreeable odor of this grass has given rise to its common name, but it is not refused by stock.

117. *Eragrostis pilosa*, Beauv.—The culms of this are slender, branching and spreading at the base. The panicle is elongated-oblong. The spikelets are 5 to 12-flowered, 2 to 4 lines long, purplish lead-color, and about equaling the pedicels. Not abundant nor important.

118. *Eragrostis Frankii*, Mey.—This is much branched and diffuse, 3 to 8 inches high, with an ovate-oblong panicle which is rather dense and spreading. The spikelets are 2 to 5-flowered, 1 to $1\frac{1}{2}$ lines long, having slender pedicels. Said to occur in Kansas, but of no known value.

119. *Eragrostis Purshii*, Schrad.—This is somewhat branched at the decumbent base, then erect, $\frac{1}{2}$ to 2 feet high. The panicle is elongated and has widely spreading branches. The spikelets are 5 to 18-flowered, 2 to $4\frac{1}{2}$ lines long, and usually much shorter than the capillary pedicels. It grows in low, sandy ground, but not abundant enough to be useful.

120. *Eragrostis oxylepis*, Torr.—The culms in this species are 2 or $2\frac{1}{2}$ feet high, branching below. The panicle is 4 to 6 inches high, narrow, with sessile or short pedicelled interrupted branches. The spikelets are large, 4 to 9 lines long, and 10 to 20-flowered. Reported in Kansas, but of no known value.

120 $\frac{1}{2}$. *Eragrostis tenuis*, Gr.—The culms are tufted, erect, firm, and the lower leaves are very long. The panicle is very long, often longer than the culm, (1 to $2\frac{1}{2}$ feet long,) very loose, the slender branches spreading and dividing into diverging capillary pedicels. A very graceful grass, but of doubtful value.

121. *Eragrostis capillaris*, Nees.—The panicle, which is usually much longer than the culm (1 to 2 feet long), is widely expanding, having its spreading branches and long, diverging pedicels capillary. The very small, cylindrical spikelets (2 to 4-flowered) are greenish or purplish. The leaves and sheaths are very hairy or sometimes nearly smooth. A late summer or autumn weed.

122. *Eragrostis pectinacea*, Gr.—This is much like the last species, but the main branches of the panicle are bearded in their axils (in the preceding these are mostly naked), and the spikelets are flat and 5 to 15-flowered, 2 to 3 lines long, and 1 line wide. An abundant weed in meadows, pastures, &c., late in summer and autumn.

EATONIA, Raf.—A genus of two (American) species, of perennial grasses, with numerous spikelets in a contracted or slender panicle. The spikelets are usually 2-flowered, and with an abortive rudiment or pedicel. The outer glumes are unequal, the lower narrowly linear, keeled, 1-nerved, the upper broadly obovate, shorter than the spikelet, 3-nerved, not keeled, and scarious on the margin. The flowering glumes are oblong, obtuse, compressed, and chartaceous. The palea is narrow and hyaline.

123. OBTUSE EATONIA; PRAIRIE GRASS; *Eatonia obtusata*, Gr.—A grass much like the CRESTED KOELEERIA in habit and size, but somewhat inferior in value. The panicle is dense and contracted, or rarely slender. The florets are very obtuse, and the second glume is broader than long, and saccate around the floret.

124. EASTERN EATONIA; PRAIRIE GRASS; *Eatonia Pennsylvanica*, Gr.—A taller and more robust species than the last, with a larger and more open panicle. The florets are longer and usually more pointed (sometimes even awned), and the second glume is not so broad in proportion to its length. Like the last in value, but not abundant in our State. (Plate No. 124.)

KOELEERIA, Pers.—A small genus of perennial tufted grasses with a dense and narrow spike-like panicle. The spikelets are 3 to 5-flowered and compressed. The outer glumes are membranaceous,

keeled, unequal, lanceolate, about as long as the spikelet, and scarious on the margin. The flowering glumes are similar, but more scarious or hyaline, rarely mucronate, and the upper one usually smaller and imperfect. The palet is very thin, 2-keeled and 2-toothed.

125. CRESTED KOELERIA; PRAIRIE GRASS; *Koeleria cristata*, Pers.—It is quite a variable grass; the culms are 1 (rarely only a few inches) to 3 feet high, and the spike-like panicle varies from 3 to 6 inches in length, being more or less interrupted or lobed at the lower part. The grass is usually more or less softly hairy. It is found on hills and prairies, not very abundant but affording pasturage that is relished by cattle. By some it is considered a promising grass and worthy an attempt at cultivation. (Plates Nos. 124 and 125.)

MELICA, L.—A genus of perennial grasses, mostly western, having soft, flat leaves and flowers somewhat distant in simple or slightly branched panicles. The spikelets are 2 to many-flowered, usually convolute around each other, the upper one 2 or 3, smaller and imperfect. The outer glumes are membranaceous or hyaline and awnless, the lower 3 to 5-nerved, the upper sometimes 7 to 9-nerved, the lateral nerves vanishing within the scarious margin. The flowering glumes are of thicker texture, almost coriaceous, rounded or flattish on the back, 5 to 9-nerved, the lateral nerves vanishing below the apex, the central one sometimes ending in a point or awn. The palets are shorter than their glumes, 2-keeled and ciliate on the keels and apex.

126. MELIC GRASS; *Melica mutica*, Walt.—A perennial grass, growing in loose tufts, about 2 feet high, the lower leaves and sheaths soft, hairy; the upper leaves are narrow, 3 to 4 inches long, and gradually pointed. The panicle is simple or little branched, except in the variety *diffusa*, in which it is larger and more branched. It is a grass relished by cattle, but it is not abundant, and probably not adapted to cultivation.

DIARRHENA, Raf.—A genus of two species (one American), having a narrow, loose panicle. The spikelets are three to five-flowered, the one or two uppermost being imperfect. The outer glumes are unequal, shorter than the flowers, and coriaceous; the lower one is narrow, acute, keeled, one-nerved; the upper one is larger, ovate, five-nerved, keeled and acute, or pointed. The flowering glumes are broadly ovate, rigidly coriaceous, rounded on the back, three-nerved; the nerves are prominent, and unite at the apex in a strong, pointed tip. The palets are shorter than the glumes, rigid, broad, and two-keeled. The stamens are two, and the grain is rather larger than the flower.

127. *Diarrhena Americana*, Beauv.—A perennial grass, with running root-stocks and simple culms 2 or 3 feet high. The leaves are long and linear-lanceolate. The panicle is very simple, consisting of a few short-pedicelled spikelets (2 or 3 lines long). Not abundant nor of any known value.

UNIOLA, L.—A small genus of perennial grasses with creeping root-stocks, broad leaves and large spikelets in a panicle. The spikelets are closely many-flowered, very flat and 2-edged, one or more of the lowest flowers being neutral and consisting only of an empty glume. The glumes are lanceolate, compressed-keeled, rigid coriaceous—the flowering ones larger and many-nerved. The palet is rigid, 2-keeled, the keels narrowly winged.

128. BROAD-FLOWERED FESCUE-GRASS; *Uniola latifolia*, Mx.—A very handsome grass, 2 to 3 feet high, with very broad leaves and a spreading panicle. The showy, flat, drooping spikelets are longer than of any other American grass—being an inch or more long and nearly half as wide. It is a perennial grass growing in tufts in moist soil, but not abundant. Its value has not been tested. (Plate No. 128.)

DISTICHLIS, Raf.—A small genus differing from *Poa* in having many-nerved coriaceous glumes. The spikelets are dioecious; the pistillate flowers are more rigid and larger than the staminate ones; they are many-flowered, compressed and crowded in a dense, somewhat open panicle. The outer glumes are herbaceous, narrow, keeled, acute, and shorter than the flowers. The flowering glumes are rigid and membranous or almost coriaceous keeled, many-nerved, and acute. The palet has the two keels narrowly winged.

129. SALT GRASS; MARSH GRASS; *Distichlis maritima*, Raf.—This species grows to a height of 6 to 18 inches, and has numerous 2-ranked leaves; the leaves are rigid and sharp-pointed. The panicle is usually short and spike-like, but sometimes

loose with longer erect branches. This grass (until recently called *Brizopyrum spicatum*) grows in marshy (alkaline) places. It furnishes inferior pasturage and poor hay, though extensively cut in the West. (Plate No. 129.)

DACTYLIS, L.—A genus including but one species, which is naturalized from Europe. Its spikelets are 3 to 5-flowered, and crowded in one-sided clusters forming a dense branching panicle. The outer glumes are unequal, lanceolate, acute, rigid, with hyaline margin, keeled, and 1 to 3-nerved. The flowering glumes are larger, more rigid, keeled, 5-nerved, sharp-pointed and ciliate on the keel. The palea is little shorter than its glume, narrow and thinner, and 2-keeled.

130. ORCHARD GRASS; COCK'S-FOOT GRASS; *Dactylis glomerata*, L.—This well-known grass is about 3 feet high, with roughish culms and leaves. The panicle is generally 2 or 3 inches high, its upper branches short, the lower longer and spreading. This is one of the most widely diffused of all grasses, and its virtues are universally recognized. (Plate No. 130.)

POA, L.—A very large genus, containing some of our most important grasses. They are all perennial, except one species. The flowers form a narrow or spreading panicle; the spikelets being somewhat compressed, usually 2 to 5-flowered. The rachis between the flowers is sometimes hairy, and the flowers are generally perfect. The outer glumes are usually shorter than the flowers, membranaceous, 5 or rarely 7-nerved, the intermediate nerves frequently obscure; they are often scarious at the apex and margins, smooth or pubescent, often with a few loose or webby hairs at the base. The palea is as long as the flowering glume, and prominently 2-nerved or 2-keeled.

131. MOUNTAIN SPEAR GRASS; *Poa andina*, Nutt.—A perennial, tufted grass, with short, narrow, pointed leaves. The culms are 6 to 18 inches high, wiry and naked, except about two very short leaves; the blade an inch long, or almost wanting. The panicle is 2 to 4 inches long, narrow, erect, and rather loose; its branches are mostly in pairs, about an inch long, and flowering from the upper two-thirds, or nearly throughout. The outer glumes are $1\frac{1}{2}$ lines long, the margins scarious. The flowering glumes are oblong, softly and finely pubescent, and below, villous; the apex is scarious and tinged with purple. This grass is probably not of great agricultural value. (Plate No. 131.)

132. OREGON BLUE-GRASS; *Poa tenuifolia*, Nutt.—A perennial grass, with culms $1\frac{1}{2}$ to 3 feet high, erect, and scantily clothed with a few short, narrow leaves. The panicle is erect, 3 to 5 inches long, rather narrow and loose; its branches are mostly in pairs, unequal, from $\frac{1}{2}$ to $1\frac{1}{2}$ inches long, and flowering above the middle. The outer glumes are about 2 lines long, nearly as long as the flowers. The flowering glumes are lanceolate, 2 to 3 lines long, the apex and margin scarious and of a bronze or purplish color. It grows in abundance westward—as in Colorado, California, Oregon, &c.—and there at least affords considerable pasturage. Reported in Kansas.

133. ANNUAL SPEAR-GRASS; GOOSE GRASS; *Poa annua*, L.—This species is a native of Europe, but extensively naturalized in this country. Its culms are low, usually 3 to 10 inches high, with pale-green, tender leaves. It is an annual grass, very nutritious, but not abundant.

134. WIRE GRASS; BLUE GRASS; *Poa compressa*, L.—This is often confused with *Poa pratensis*, or Kentucky blue-grass, but it has flattened, decumbent and wiry stems, and a shorter, narrower and more scant panicle. The hard stems are 1 foot to 18 inches long. The leaves are scanty, smooth and short, and of a dark bluish-green color. As to the value of this species there is much dispute, but it is by no means comparable to the Kentucky blue-grass. (Plate No. 134.)

135. FOWL MEADOW-GRASS; FALSE RED-TOP; *Poa serotina*, Ehr.—The culms of this perennial species are 2 to 3 feet high, but there are no running root-stocks. The leaves are 3 to 6 inches long, and 2 or 3 lines wide; the sheaths (and ligule) are long, smooth and striate. The panicle is 5 to 10 (or 12) inches long, and 1 to 3 inches

wide; its branches are 1 to 4 inches long, the longer ones subdivided and flowering above the middle. In the eastern States it has been cultivated, and there considered valuable. It occurs more abundantly in the more northern States.

136. JUNE GRASS; KENTUCKY BLUE-GRASS; SPEAR GRASS; MEADOW GRASS; *Poa pratensis*, L.—A widely-known, cultivated and indigenous perennial grass, growing usually $1\frac{1}{2}$ to 3 feet high, with an abundance of long, soft root-leaves. The panicle is 2 to 4 inches long, pyramidal in outline, open and spreading; its branches are fine, mostly in fives, the lower ones 1 to 2 inches long, subdivided, and flowering above the middle. The spikelets are about 2 lines long, ovate, closely 3 to 5 flowered, mostly on very short pedicels. It is one of the most valuable of all wild or tame grasses. (Plate No. 136.)

137. ROUGH-STALKED MEADOW-GRASS; *Poa trivialis*, L.—The culms are erect from a somewhat decumbent base, but there are no distinct running root-stocks. The sheaths and leaves are more or less rough. The panicles are larger than in the preceding, or with branches more distant; otherwise it is much like that (*Poa pratensis*). It is introduced from Europe; it is not abundant.

138. MEADOW GRASS; SPEAR GRASS; *Poa sylvestris*, Gr.—The culms are flattish and erect. The panicle is oblong-pyramidal; its slender branches are numerous, short, in fours or more. The flowering glume is hairy (villous) on the keel for its whole length, and on the margin below the middle, but sparingly webbed at the base. This is not known to be abundant or especially valuable.

139. TALL BLUE-GRASS; WOOD SPEAR-GRASS; *Poa alsodes*, Gr.—The culms in this species are 2 to 3 feet high, slender, erect, and with about 3 narrowly-linear leaves, each 3 or 4 inches long. The panicle is about 6 inches long, very open, and composed of about 4 whorls of branches chiefly in fours; the lower ones are distant, very slender, 2 or 3 inches long, and with few flowers only toward the end of the branches. The flowers are acute, which most readily distinguishes the species. It grows in woods, &c., and is of doubtful agricultural value. (Plate No. 139.)

140. MEADOW GRASS; SPEAR GRASS; *Poa flexuosa*, Muhl.—The culms are tufted, 1 to 3 feet high. The leaves are all linear, 2 to 5 inches long and gradually taper-pointed. The panicle is very effuse—its branches 2 to 4 inches to the 4 to 6-flowered spikelets (which are few and 3 or 4 lines long) or first ramification. The flowering glume is prominently nerved, scarious at the apex and villous below the middle on the keel and margins, but no web at the base. Rare if at all occurring in Kansas.

GLYCERIA, R. Br.—A genus of perennial, smooth marsh grasses. The spikelets are cylindrical or flattish, several or many-flowered, in a narrow or diffuse panicle. The rachis is smooth and readily disarticulates between the flowers. The outer glumes are shorter than the flowers, unequal, membranaceous, 1 to 3-nerved, and unawned. The flowering glumes are membranaceous or subcoriaceous, obtuse, awnless, more or less hyaline, and denticulate at the apex; they are rounded on the back, 5 to 9-nerved—the nerves separate and vanish before reaching the apex. The palea is as long as its glume, 2-keeled, entire or bifid at the apex.

141. RATTLESNAKE GRASS; TALL QUAKING-GRASS; *Glyceria Canadensis*, Trin.—The culms are about 3 feet high, stout and leafy. The panicle is large, 6 to 9 inches long, oblong-pyramidal, and at length drooping; its branches are mostly in threes, the larger 3 or 4 inches long and subdivided near the base. The spikelets when mature are nearly three lines long, rather turgid, usually 6 to 8-flowered. The empty glumes are shorter than the flowering ones, and purplish. It grows in swamps and wet places, is a very ornamental grass, also useful for hay and pasture when abundant.

142. NERVED MEADOW GRASS; NERVED MANNA GRASS; *Glyceria nervata*, Trin.—The culms are 2 or 3 feet high, usually somewhat decumbent below, often branching and rooting at the lower joints. The panicles are 4 to 8 inches long, nodding when

young, loose and spreading, with capillary branches. The spikelets are small, about 5-flowered, oblong, frequently becoming purplish with age. The outer glumes are unequal, thin and small, neither of them much more than half as long as the flower. It is considered a nutritious and valuable grass—growing in wet places.

143. REED MEADOW GRASS; WHITE SPEAR GRASS; *Glyceria aquatica*, Sm.—The culm is stout, erect, leafy, 3 to 4 feet high. The leaves are a foot or two long, flat or somewhat rough, especially on the edges. The panicle is 9 to 15 inches long, and much branched; its branches are in half whorls, arranged alternately on the main axis, at first erect, but spreading with age. The spikelets are about 3 lines long, 5 to 9-flowered, on capillary pedicels. The species grows in wet meadows and swamps, and when abundant is of some value. (Plate No. 143.)

144. FLOATING MANNA GRASS; *Glyceria fluitans*, R. Br.—The culms are usually 3 or 4 feet high, rather thick and succulent, and very leafy. The panicle is often a foot long, very narrow; its short distant branches are mostly in twos or threes, 1 to 2 inches long, each with 2 to 4 spikelets. The spikelets are $\frac{1}{2}$ to $\frac{3}{4}$ inch in length, cylindrical, and 7 to 13-flowered. This grass grows in shallow water, and its seeds furnish food highly relished by fishes—as trout, carp, etc. It is also said that stock of all kinds are fond of it.

145. MANNA GRASS; *Glyceria distans*, Wahl.—The culms are tufted, growing $\frac{1}{2}$ to 2 feet high. The leaves are short, narrow, and glaucous. The panicle is very variable, erect, narrow and one-sided. The spikelets are 3 to 12-flowered. This species—or at least a variety of it—is found in a region including the extreme western portion of our State. Of no known value.

FESTUCA, L.—A large genus of annual and perennial grasses with panicked or racemose flowers not webby at the base. The spikelets are 3 to many-flowered. The outer glumes are unequal, shorter than the flowers, the lower 1-nerved and the upper 3-nerved, narrow, keeled, and acute. The flowering glumes are membranous or subcoriaceous, narrow, rounded on the back, more or less distinctly 3 to 5-nerved, acute or tapering into a straight awn, rarely obtusish. The palea is narrow, flat, and prominently 2-nerved or 2-keeled.

146. SMALL FESCUE; *Festuca tenella*, Willd.—This is an annual (or at most a biennial) grass with slender stems 6 to 18 inches high. The erect leaves are 1 to 3 inches long. The panicle is spike-like, and often one-sided. The spikelets (including the awns) are 4 to 5 lines long, and 7 to 15-flowered. Of little or no agricultural value.

147. SHEEP'S FESCUE GRASS; *Festuca ovina*, L.—This is a densely tufted perennial grass with many short root-leaves and slender culms 1 to 1½ feet high. The panicle is 2 to 4 inches long, narrow, its branches mostly single and alternate, erect and few-flowered. The spikelets are mostly 3 to 5-flowered and about 3 lines long. It is a good pasture grass. The cultivated forms are derived from Europe, though it is also indigenous in this country. (Plate No. 147.)

148. HARSH FESCUE GRASS; *Festuca duriuscula*, L.—This is much like the preceding species, but rather taller, and stem-leaves often flat and sheaths pubescent. The panicle is more open, the oblong spikelets are about 6 to 10-flowered. Occurs with the last, of which it was formerly considered a mere variety.

149. MEADOW FESCUE GRASS; TALL FESCUE; RANDALL GRASS; EVERGREEN GRASS; *Festuca elatior*, L.—A perennial grass 2 to 4 feet high, with flat leaves about a foot long. The panicle is somewhat one-sided, loose and spreading in flower, (but contracted after flowering,) from 6 to 10 inches long; its branches are 1 to 2 inches long, mostly in pairs below and single above. The spikelets are lanceolate or linear, about half an inch long, 5 to 10-flowered. Introduced from Europe, where it is one of the standard meadow grasses. Occasionally found in our meadows naturalized. (Plate No. 149.)

150. MEADOW FESCUE-GRASS; *Festuca pratensis*, Huds.—This is much like the last; it is, in fact, generally considered but a smaller variety of it. It has a simple or close panicle, and smaller or narrow spikelets. Not found in abundance.

151. DROOPING FESCUE; *Festuca nutans*, Willd.—The culms are 2 to 4 feet high, naked above. The leaves are broadly linear, taper-pointed, dark-green, and often rather hairy. The panicle consists of several long and slender branches, which are drooping when old. The spikelets are 3 to 5-flowered, 3 lines long, on rather long pedicels. Not very abundant.

152. SHORT'S FESCUE; *Festuca Shortii*, Kunth.—This is generally considered a variety of the last, differing mainly in being stouter, and the spikelets about five-flowered.

BROMUS, L.—A large genus of coarse grasses with large spikelets; the native species are perennial. The spikelets are 5 to many-flowered in a panicle, the rachis between the flowers glabrous. The outer glumes are more or less unequal, shorter than the lowest flower, membranaceous, acute, awnless, or short mucronate, 1 to 9-nerved. The flowering glumes are rounded or keeled, 5 to 9-nerved, acute or awned from below the mostly 2-cleft apex; the palea (to which the grain adheres) is rather shorter than the glumes, 2-keeled, the keels rigid and ciliate.

153. SCHRADER'S GRASS; RESCUE GRASS; *Bromus unioloides*, Willd.—The culms are about 3 feet high, bearing a panicle which is large, open and spreading. The large, flattened spikelets are from 1 to 1½ inches in length, 7 to 10-flowered. The flowering glume extends into a fine point or short awn. This is considered a valuable grass in the South, but here it is scarce and unimportant.

154. CHEAT OR CHES; *Bromus secalinus*, L.—This well-known pest, 2 to 3 feet high, has a spreading panicle 4 to 6 inches long. The spikelets are usually 5 to 10-flowered. The flowering glume is keeled on the back and bears an awn of variable length from below the point. It should not be allowed to ripen seed (it is an annual) for it is propagated in the natural way—notwithstanding the old tradition that "wheat changes into ches." (Plate No. 154.)

155. UPRIGHT CHES; *Bromus racemosus*, L.—The culms are more slender than in the preceding species. The panicle is erect, simple, rather narrow, contracted in fruit (of the former it is spreading in fruit). The flowering glume bears an awn of its own length. This also is a naturalized annual from Europe, but not so abundant.

156. SOFT CHES; *Bromus mollis*, L.—The panicle of this introduced species is erect and closely contracted in fruit. The closely imbricated flowers, as well as the leaves, &c., are downy. Otherwise much like the foregoing, but still less abundant.

157. WILD CHES; *Bromus Kalmii*, Gr.—The culms are slender, 1½ to 3 feet high, with more or less hairy leaves and sheaths. The panicle is simple, small, 3 to 4 inches long. The spikelets are closely 7 to 12-flowered, and densely silky all over; the awn is one-third the length of the flower. This species is perennial. Not very abundant nor important.

158. CILIATE CHES; *Bromus ciliatus*, L.—This perennial grass is tall, 3 to 5 feet high, with a compound very loose panicle. The spikelets are 7 to 12 flowered. The lower palea is tipped with an awn one-half to three-fourths its length. The flowering glume has appressed silky hairs near the margin, but in the variety *purgans*, Gr., it is clothed all over with short and fine appressed hairs. Not abundant enough to be important.

LOLIUM, L.—A small genus of perennial grasses with the spikelets several-flowered, solitary on each joint of the continuous rachis of the simple spike; they are placed edgewise against the rachis, the glume absent on the inner side, and the outer empty glume is shorter or longer than the spikelet. The flowering glumes are rounded on the back, not keeled; the palea is shorter and 2-keeled.

159. RYE GRASS; ITALIAN RYE GRASS; *Lolium perenne*, L.—The culms are 2 to 3 feet high, very leafy, and bear a loose spike-like panicle 6 inches or more in length.

The spikelets are peculiar in being placed edgewise to the stem; they are $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long, and generally 7 to 11-flowered. The outer empty glume is half or more than half as long as the spikelets, the inner one being absent usually. This species is introduced from Europe, and doubtless to be found in Kansas. An important and very valuable grass in the opinion of those who have cultivated it in the East and the South. (Plate No. 159.)

AGROPYRUM, Beauv.—A genus of perennial grasses easily recognized by the 3 to 5-flowered compressed spikelets, which are sessile, and placed with their side against the axis of the simple spike. The outer glumes are nearly equal, 1 to 3-nerved, pointed or awned. The flowering glumes are similar to the others, generally broader, rounded on the back, 3 to 7-nerved, pointed or awned at the apex. The palea is nearly as long as its glume, the two nerves being prominent, ciliate, and almost marginal.

160. COUCH GRASS; QUICK GRASS; QUITCH GRASS; WHEAT GRASS; TWITCH GRASS; DOG GRASS; *Agropyrum repens*, Beauv.—This has extensive root-stocks that take root at every joint; it has an abundance of foliage, and the culms are 2 to 3 feet high, terminated by a close, narrow spike of flowers 3 to 6 inches long. The spikelets are placed flatwise to the stem, 3 to 8-flowered, with the outer glumes nearly equal, and opposite. This is generally considered one of the very worst of weeds; yet there are those who claim that its nutritive qualities more than compensate for the trouble it gives by its persistent and spreading root-stocks. (Plate No. 160.)

160½. WHEAT GRASS; CLUMP WHEAT GRASS; *Agropyrum tenerum*, Vasey.—This grass has been hitherto considered a mere variety of the preceding. Dr. Vasey, in a recent Bulletin of the U. S. Department of Agriculture, says it may prove valuable for some qualities; it furnishes a large quantity of foliage and matures early, and for these qualities it may be desirable to cultivate it in a mixture of grasses for pasture. It is found in western Kansas. It has a narrow, slim spike of flowers and stiff culms. It does not have running root-stocks, but grows in clumps of variable size.

161. WESTERN WHEAT GRASS; COLORADO BLUE JOINT; COLORADO BLUE STEM; WILD QUACK GRASS; GUMBO GRASS; *Agropyrum glaucum*, R. & S.—This has often been considered a mere variety of the former, but it has stouter and more rigid culms and leaves; the latter are often stiff. It is of a light bluish-green color, and the spike is generally shorter, denser, and with larger spikelets. It is abundant, and yields much and valuable hay, particularly in the western portion of the State.

162. WHEAT GRASS; *Agropyrum caninum*, Reich.—The culms are 1 to 3 feet high (no running root-stock). The spike is more or less nodding—at least not strict. The outer glumes are 5 to 7-nerved, acuminate or with long awns. The flowering glume is 5-nerved near the tip, with mostly spreading awns. A variable grass—perhaps to be found in Kansas, but not important.

163. WHEAT GRASS; *Agropyrum violaceum*, Beauv.—This species has no running root-stocks. The slender culms are 1 to 2 feet high, the leaves short, mostly setaceous. The spike is dense, strict, and rigid, usually tinged with violet or purple. The outer glumes are conspicuously 5-nerved. The flowering glume is strongly 5-nerved, with an awn from half to fully as long. Reported in Kansas, but of no agricultural value.

HORDEUM, L.—A small genus of annuals or biennials, with flowers in dense spikes. The spikelets are 2 to 3 at each joint of the notched rachis, and have one flower with an awl-shaped rudiment of a second. The central spikelet of the cluster is perfect and sessile, the lateral ones short-stalked and imperfect or abortive. The slender and awned or pointed outer glumes are side by side, two to each spikelet, or six to each joint. The flowering glume is shorter, herbaceous, oblong or lanceolate, rounded on the back, not keeled, 5-nerved, acute or long-awned. The palea is shorter and 2-keeled.

164. SQUIRREL-TAIL GRASS; *Hordeum jubatum*, L.—The culms are $\frac{1}{2}$ to 2 feet high. The glumes bear a capillary awn about 2 inches long, giving the spike a bushy appearance. Of no agricultural value.

165. SMALL SQUIRREL-TAIL GRASS; *Hordeum pusillum*, Nutt.—Much like the preceding, but lower; the spike is shorter, and not so bushy. The glumes bear an awn but $\frac{1}{4}$ to $\frac{1}{2}$ inch long. It is an annual and very early grass, relished by stock; but it ripens and dies in a few months, and is then unsightly as well as worthless.

ELYMUS, L.—A genus of perennial grasses, with simple, stout spikes. The spikelets are 2 to 4 at each joint of the rachis, sessile, and 1 to 6-flowered. The outer glumes, two for each spikelet, are nearly side by side in its front, forming a kind of involucre for the cluster; they are narrow, rigid, 1 to 3-nerved, and pointed or awned. The flowering glumes are herbaceous, rather shorter, oblong or lanceolate, rounded on the back, not keeled, and acute or awned. The palea is 2-keeled, and shorter than its glume.

166. WILD RYE-GRASS; SMOOTH RYE-GRASS; TERRELL GRASS; *Elymus Virginicus*, L.—This is a coarse perennial grass, the culms 2 to 3 feet high and leafy. The lower leaves are 10 to 15 inches long, broad and rough. The sheath of the upper leaf sometimes incloses the base of the spike, which is erect, dense, rigid, 2 to 5 inches long and $\frac{1}{2}$ inch thick. It begins its growth very early in spring; it often forms a considerable portion of wet meadows, and is cut for coarse hay.

167. WILD RYE; LYME GRASS; TERRELL GRASS; *Elymus Canadensis*, L.—Much like the preceding in habit and size, or larger. But its spike is 4 to 8 inches long, with the spikelets placed at intervals of about $\frac{1}{2}$ inch on the axis, usually drooping at the top. The leaves are broad and rough, the lower ones 9 to 12 inches long; quite variable. In the variety *glaucofolius*, Gr., the plants are pale or glaucous throughout. In value, similar to the last, but more abundant. (Plate No. 167.)

168. RYE-GRASS; DENNETT GRASS; *Elymus striatus*, Schultz.—This is slenderer than the preceding grasses, and varies from smooth to pubescent. The spike is 3 to 4 inches long, cylindrical and inclined to droop. The flowering glume is tipped with a slender awn an inch or more in length. In the variety *villosus*, Gr., the flowers and outer glumes are hairy, and the sheaths villous. Of no known value, except as contributing somewhat to the native forage.

169. RYE GRASS; SMALL WESTERN RYE-GRASS; *Elymus sitanion*, Schl.—The culms are densely tufted, 4 to 24 inches high. The leaves are very sharp pointed, the upper one an inch or two long with its sheath often loose and including the base of the spike. The awns are 1 to 3 inches long. This grass is abundant in the western part of the State, but of no agricultural value.

ASPRELLA, Willd.—This small genus includes perennial grasses with a loose terminal spike. The spikelets, which are 2 to 4-flowered and raised on a short pedicel, may be 2 or 3 at each joint of the rachis or there may be but one, in which case it is placed flat-wise. The outer glumes are wanting or are small, awnlike or deciduous. The flowering glumes are narrow, lanceolate, rounded on the back, 3 to 5-nerved above and long-awned from the apex. The palea is 2-keeled.

170. BOTTLE-BRUSH GRASS; *Asprella hystrix*, Willd. The culms are 3 or 4 feet high. The spike is loose, 3 to 6 inches long. The spreading spikelets are 2 or 3 together and early deciduous. The flowers have awns about an inch long. This grass is not very abundant nor important.

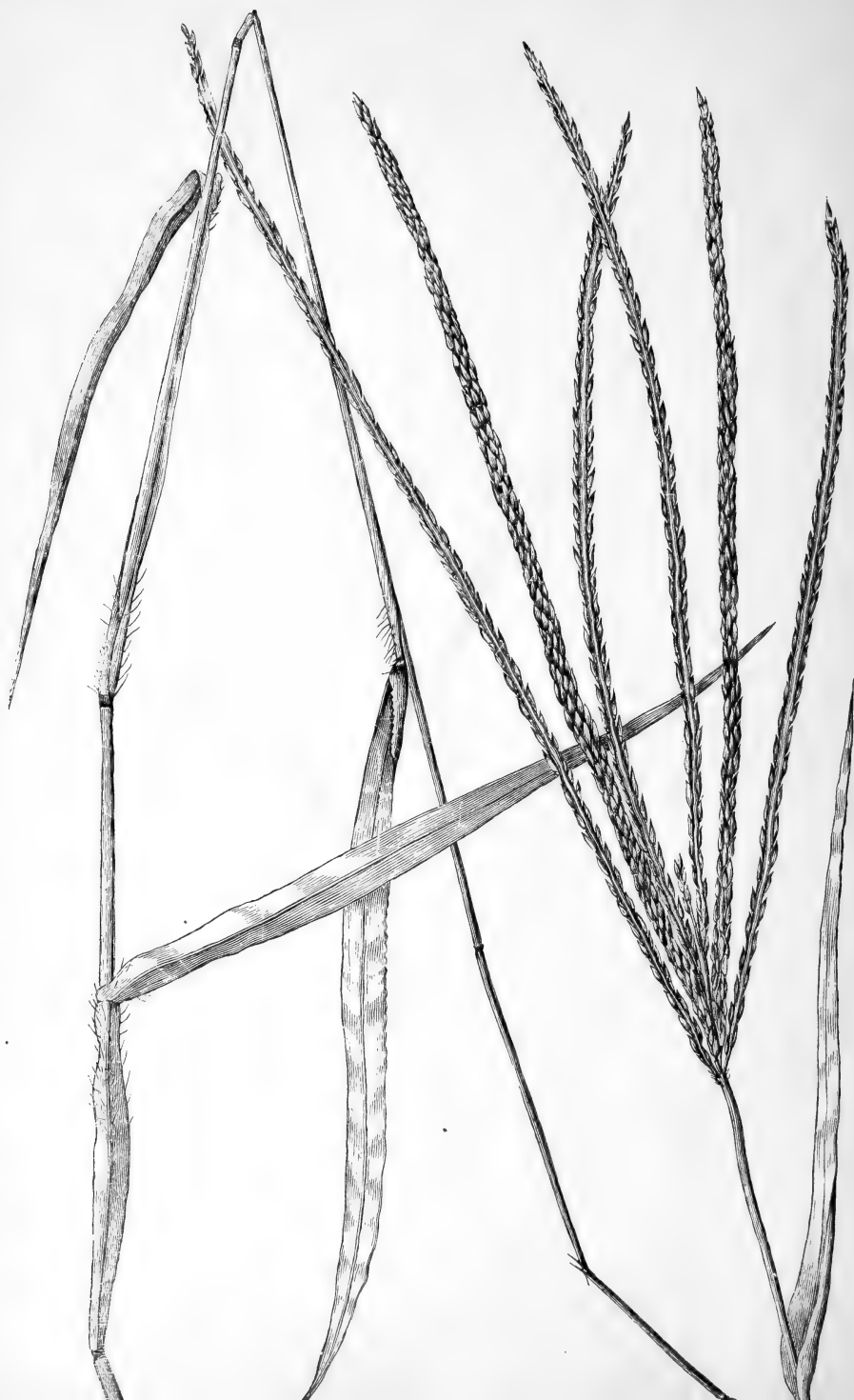








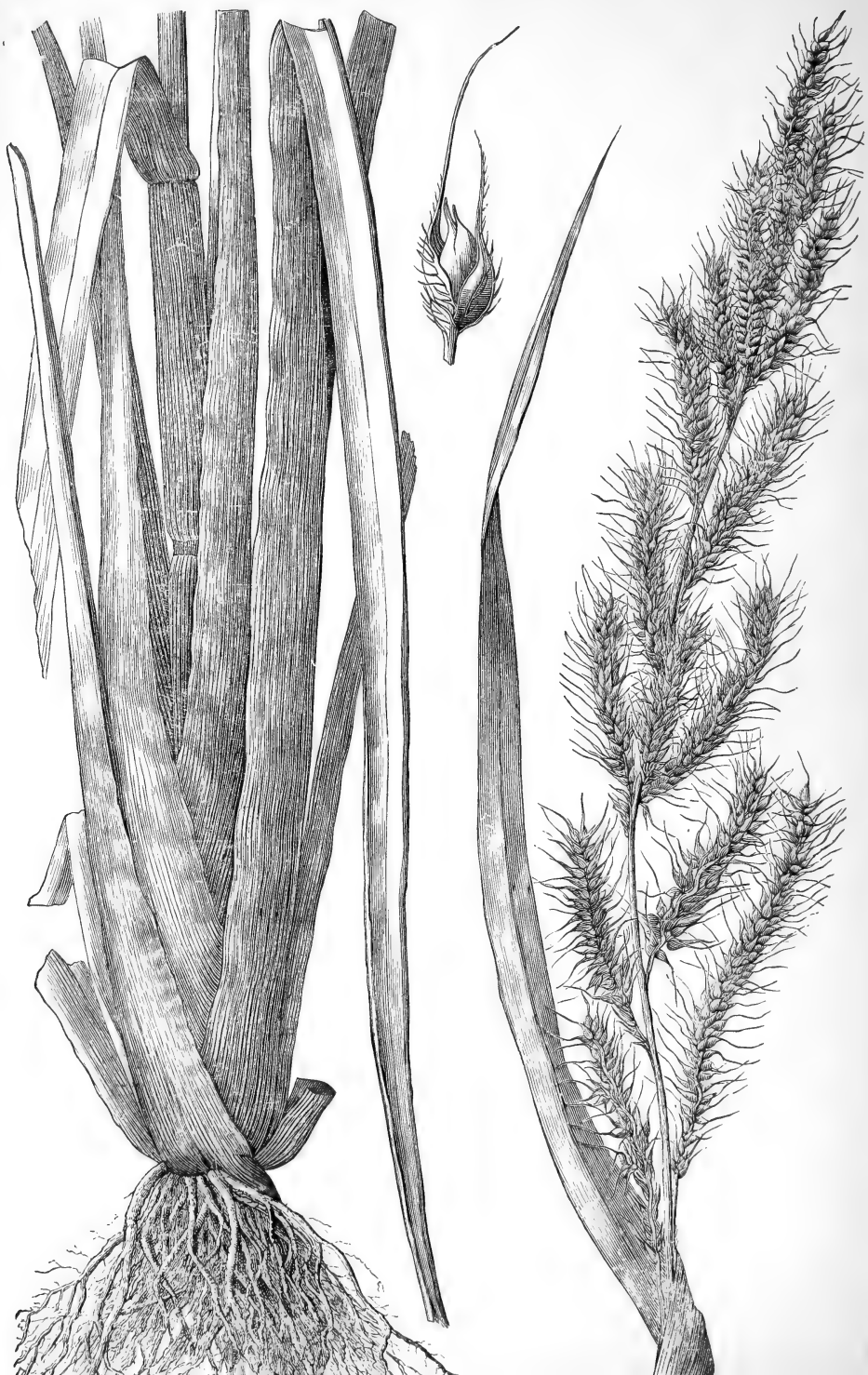




















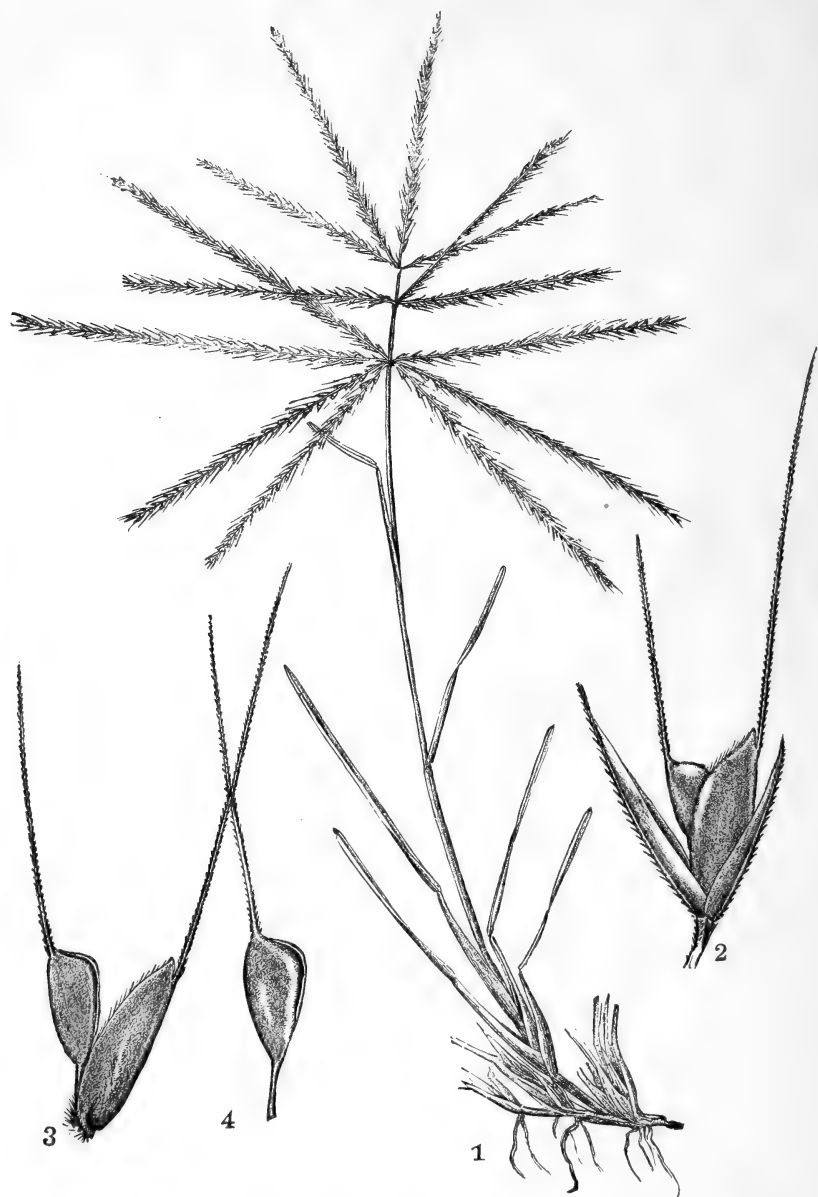








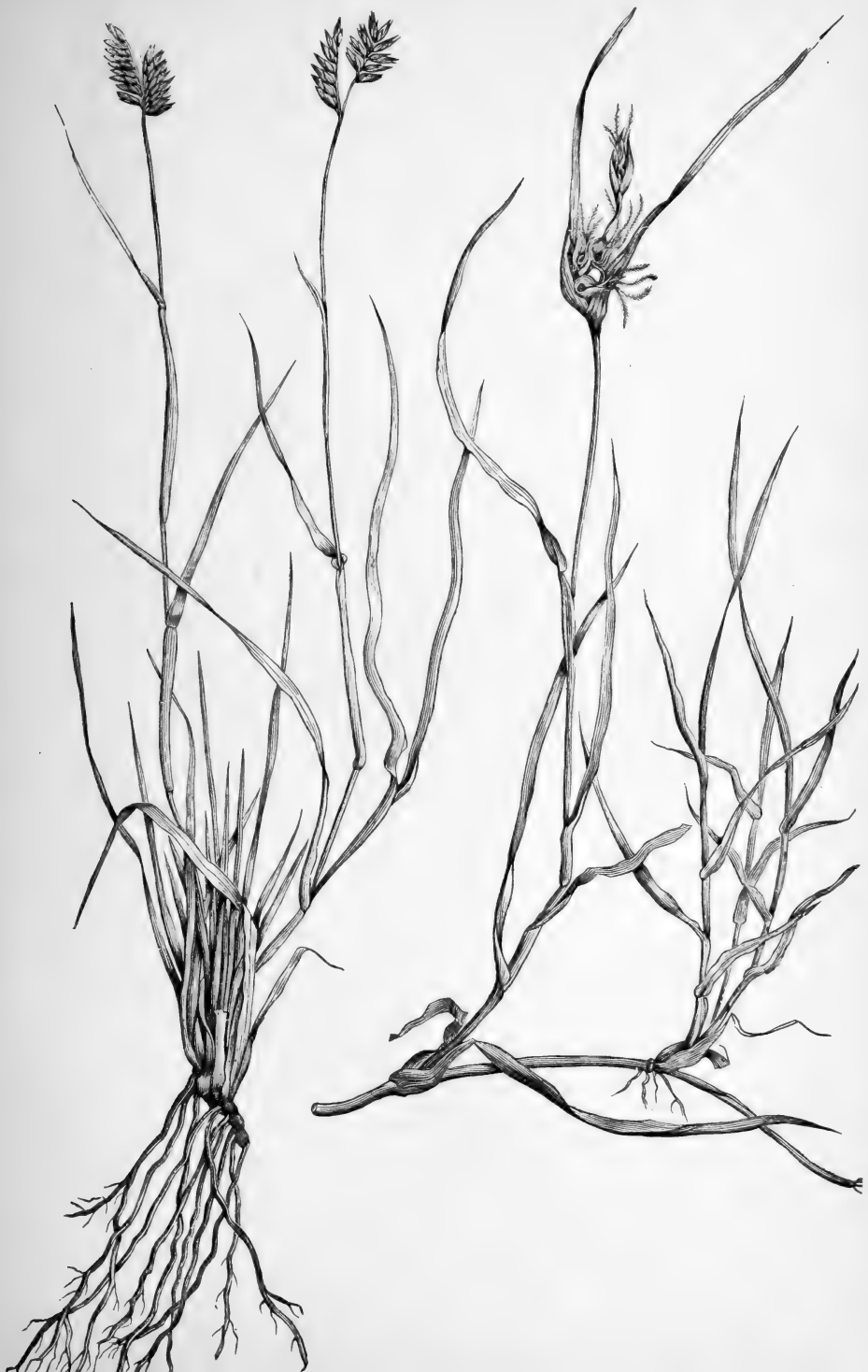


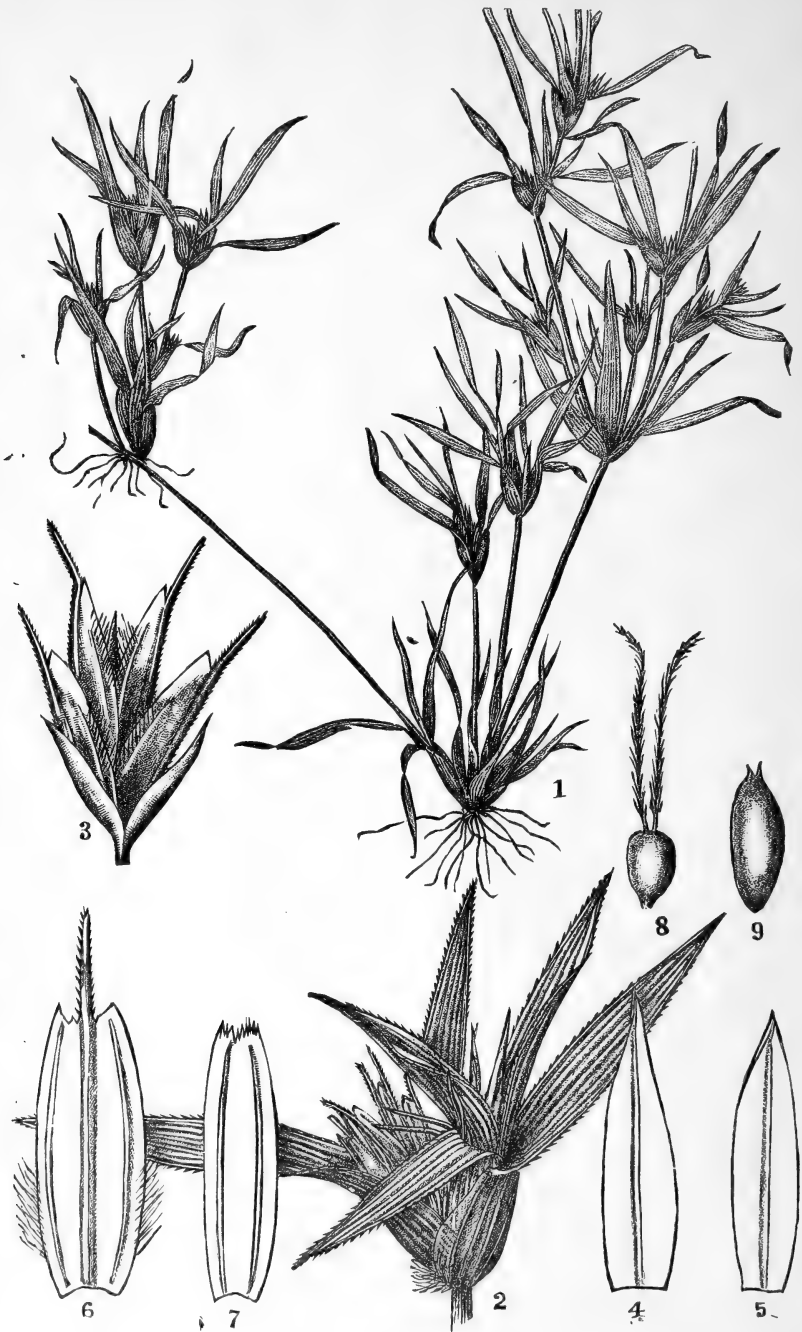


No. 96.—*Chloris verticillata*.





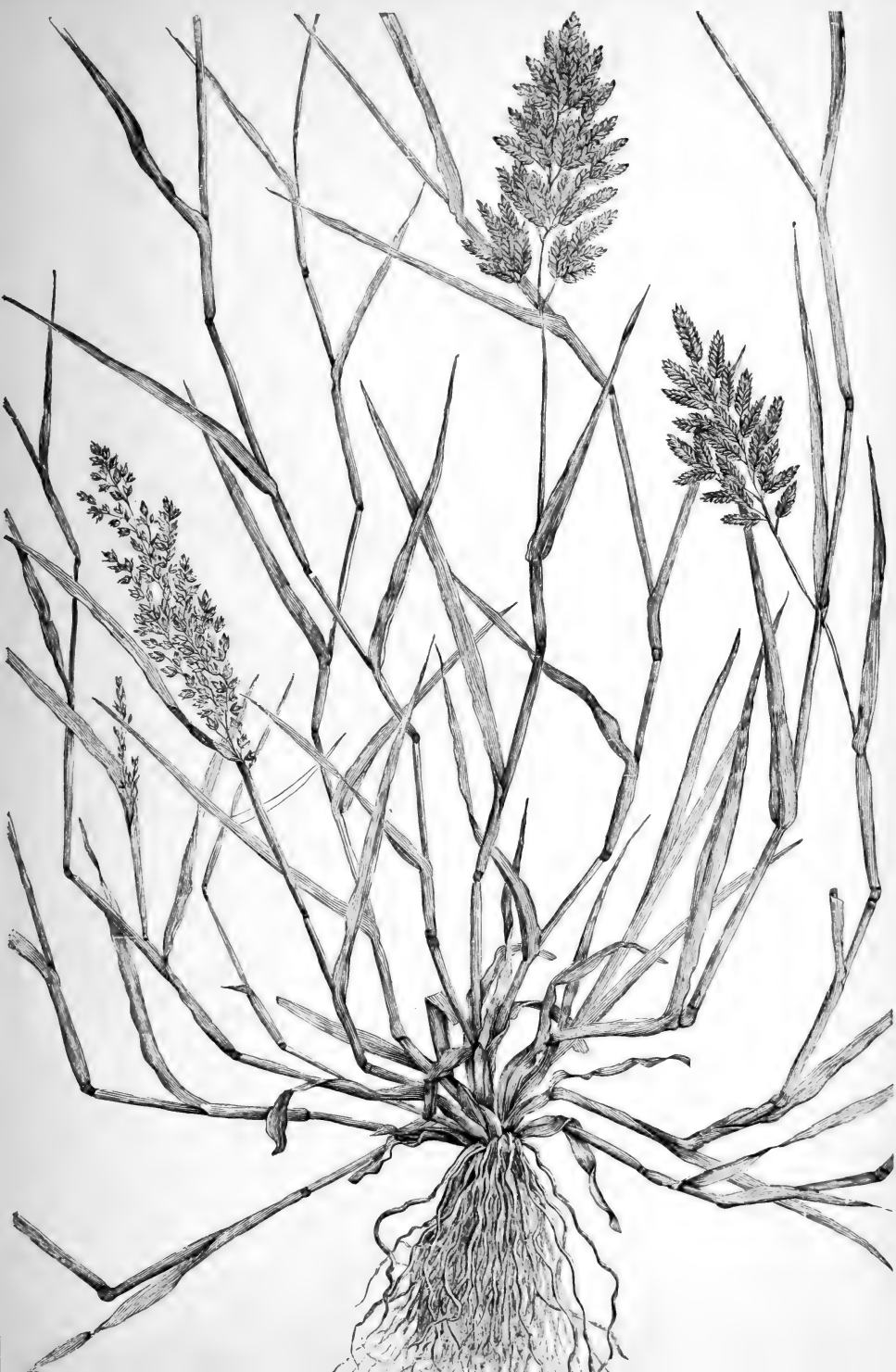


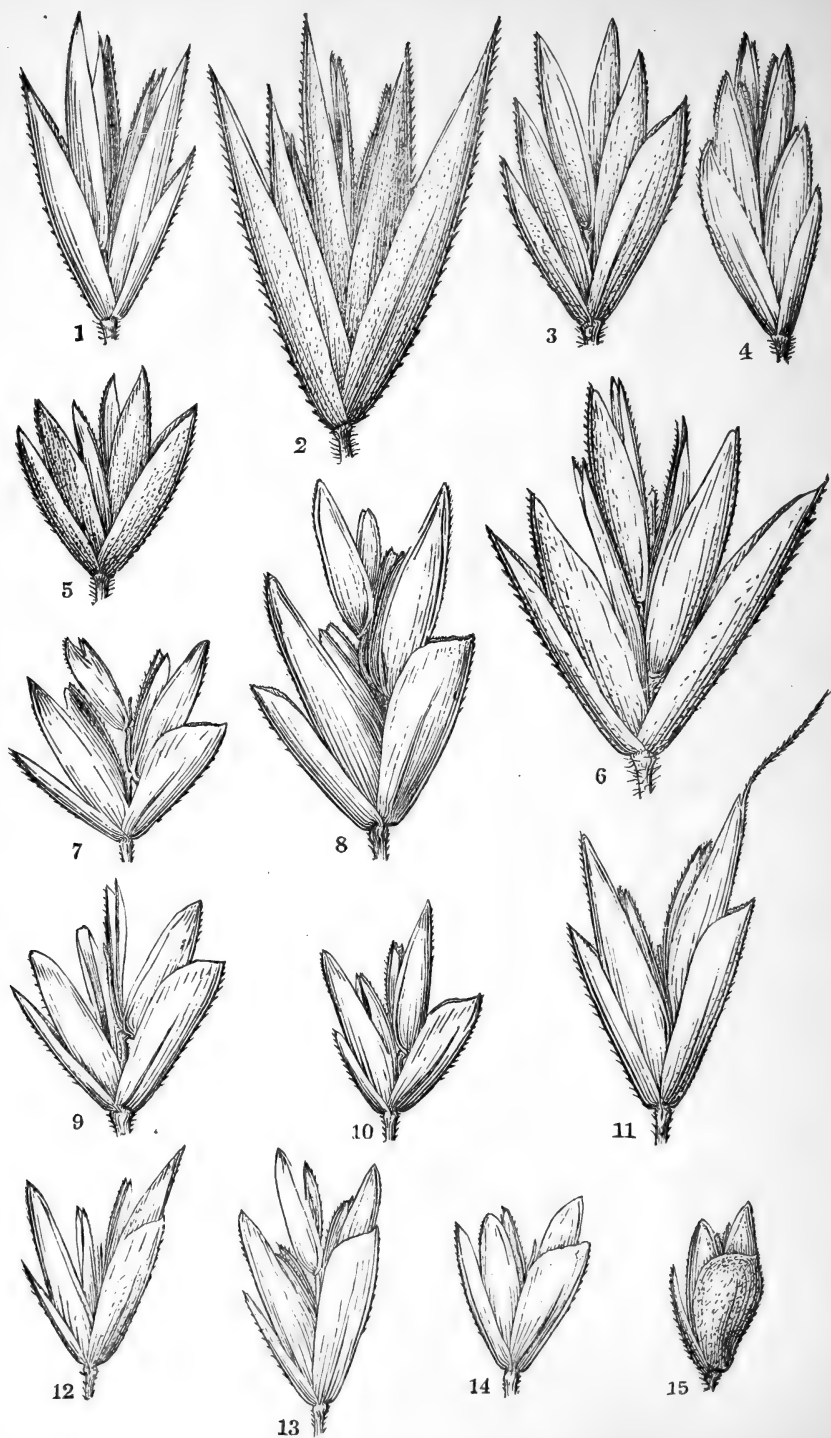


No. 105.—FALSE BUFFALO GRASS (*Munroa squarrosa*).









No. 123-5.—Spikelets of *Koeleria* (1-6) and *Eatonia* (7-15).































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AN ARTIFICIAL KEY TO THE KANSAS GRASSES.

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[Descriptions of the species are given under corresponding numbers in "The Native Grasses of Kansas," published in the Report of the State Board of Agriculture for the Quarter ending March 31, 1889.]

Spikelets sessile on opposite sides of a jointed, or channeled rachis, forming a simple spike (1).

Spikelets not as above (5).

1. Spikelets single at each joint of the rachis (2).

1. Spikelets 2 or more at each joint of the rachis (3).

2. Spikelets one-flowered, partly immersed in the triangular rachis.....30 SCHEDONNARDUS.

2. Spikelets many-flowered, placed edgewise on the rachis.....52 LOLIUM.

2. Spikelets several-flowered, placed flatwise on the rachis.....53 AGROPYRUM.

3. Outer glumes anterior, forming a sort of involucre (4).

3. Outer glumes none or 1-2 awn-like rudiments.....56 ASPRELLA.

4. All the spikelets perfect and similar.....55 ELYMUS.

4. Central spikelet of each cluster perfect and sessile, the two lateral short-stalked and sterile.....54 HORDEUM.

5. Spikelets in a coriaceous, spiny involucre, or bur.....7 CENCHRUS.

5. Spikelets capitate; small grasses, creeping or stoloniferous (6).

5. Spikelets not as above (7).

6. Fls. dioecious, staminate fls. in conspicuous spikes; perennial.....**34** BUCHLOE.
6. Fls. perfect (or upper imperfect); an annual creeping grass.....**35** MUNROA.
7. Fls. monoecious in jointed spikes; upper spikelets staminate sessile; lower spikelets pistillate, and imbedded in the thickened cartilaginous rachis... **1** TRIPSACUM.
7. Flowers not as above (8).
8. Fls. crowded in a dense cylindrical spike (9).
8. Fls. in one-sided spikes or branches of the panicle (19).
8. Fls. in simple, racemose, spicate, contracted or more or less spreading panicles (34).
9. Spike oval, or at most oblong; very dense.....**10** PHALARIS.
9. Spike cylindrical (10).
10. Spike very dense and cylindrical (11).
10. Spike less dense or very loose (12).
11. Flowering glume with a slender dorsal awn.....**18** ALOPECURUS.
11. Flowering glume destitute of an awn.....**17** PHLEUM.
12. Several bristles below the articulation of the spikelets.....**6** SETARIA.
12. No bristles below the articulation of the spikelets (13).
13. Outer glumes long-awned, flowering glumes generally awned.....**20** POLYPOGON.
13. Outer glumes often bristle-pointed, flowering glumes triple-awned.....**12** ARISTIDA.
13. Outer glumes not long-awned, flowering glumes not triple-awned (14).
14. Glumes blunt, acute, or pointed, but not awned (15).
14. Some of the glumes awned (17).
15. Spikelets 3-5-flowered, compressed.....**42** KOELERIA.
15. Spikelets 1-flowered, occasionally a rudiment above (16).
16. Lower outer glume longer than the flowering glume.....**22** AGROSTIS.
16. Outer glumes small or nearly as large as the flowering glume.....**15** MUHLENBERGIA.
17. Spikelets 1-flowered, 6 glumes present, no true palet.....**11** ANTHOXANTHUM.
17. Spikelets 1-flowered, but only 4 glumes present (18).
18. Lower outer glume larger than the flowering glume.....**22** AGROSTIS.
18. Outer glumes small or nearly as large as the flowering glume.....**15** MUHLENBERGIA.
19. Flowers dioecious, the pistillate in short capitate spikes.....**34** BUCHLOE.
19. Flowers not as above (20).
20. Glumes (or palets) only two, chartaceous, strongly compressed..... **9** LEERSIA.
20. Glumes (including palets) more than two (21).
21. Spikelets with one perfect flower and two empty, hairy, nearly equal outer glumes, with a cup-like or annular swelling of the pedicel just below the spikelet..... **4** ERIOCHLOA.
21. Spikelets, etc., not as above (22).
22. Spikelets with one or more flowers, but only one perfect (23).
22. Spikelets with two or more perfect flowers (31).
23. Flowers in indistinctly one-sided spikes or bunches (24).
23. Flowers in strictly one-sided spikes or clusters (27).
24. Spikelets solitary at each joint of the slender triangular rachis, and partly immersed in an excavation.....**30** SCHEDONNARDUS.
24. Spikelets not as above (25).
25. Stamen 1, palet only 1-nerved, nearly as long as its glume.....**21** CINNA.
25. Stamens 2 or 3, palet 2-keeled or 2-nerved (26).
26. Spikelets several-flowered, flowering glumes awnless.....**33** LEPTOCHLOA.
26. Spikelets with 1 (or rarely 2) perfect flower and a bristle-like rudiment or awn-like pedicel.....**29** GYMNOPOGON.
27. Spikelets sessile and remotely alternate on long and filiform branches of the panicle, flowers awned.....**29** GYMNOPOGON.
27. Spikelets not as above, flowers awned or awnless (28).
28. Flowers awned (29).
28. Flowers awnless (30).
29. Spikes digitate or fasciculate at the summit of the culm.....**28** CHLORIS.
29. Spikes numerous in a racemose panicle, or one terminal; spikelets densely crowded.....**31** BOUTELOUA.

30. Spikes solitary or paniculate, spreading or deflexed, flattened (80).	
30. Spikes triangular, racemose; spikelets <i>much</i> flattened.....	27 SPARTINA.
30. Spikes racemed, slender, usually numerous.....	33 LEPTOCHLOA.
31. Spikelets in dense fascicles or glomerate clusters indistinctly or not at all one-sided	47 DACTYLIS.
31. Spikelets not as above (32).	
32. Spikes digitate at the summit of the culm, (sometimes scattering ones lower down); spikelets crowded.....	32 ELEUSINE.
32. Spikes, etc., not as above (33).	
33. Spikelets with 1 (rarely 2) perfect flower and a bristle-like rudiment or awn-like pedicel.....	29 GYMNOPOGON.
33. Spikelets not as above, many-flowered, narrow.....	39 DIPLACHNE.
34. Spikelets sessile and remotely alternate on long and filiform branches of the panicle, one (or 2) flowered and a bristle-like rudiment or an awn-like pedicel.....	29 GYMNOPOGON.
34. Spikelets not as above (35).	
35. Spikelets two-flowered (36).	
35. Spikelets three to many-flowered (41).	
35. Spikelets one-flowered, at least but one flower perfect (52).	
36. Swamp grasses, very tall (7-12 ft.), with long and broad leaves.....	36 PHRAGMITES.
36. Not as above (37).	
37. Second glume broadly obovate, not keeled.....	41 EATONIA.
37. Second glume not broadly obovate (38).	
38. Flowering glumes with a fine dorsal awn below the middle.....	25 DESCHAMPSIA.
38. Flowering glumes destitute of awns (39).	
39. Palet about equaling the flowering glume (40).	
39. Palet shorter than its glume, ciliate on keel and apex	43 MELICA.
40. Spikelets usually more than 2-flowered, somewhat compressed.....	48 POA.
40. Spikelets usually one (rarely 2) flowered, not compressed.....	19 SPOROBOLUS.
41. Flowering glumes with a flattish, twisted, bent awn	26 DANTHONIA.
41. Awns absent or not as above (42).	
42. Swamp grasses, very tall (7-12 ft.), with long and broad leaves.....	36 PHRAGMITES.
42. Not as above (43).	
43. Spikelets in dense fascicles or glomerate clusters at the ends of the short branches of a close, short panicle.....	46 DACTYLIS.
43. Spikelets not as above (44).	
44. Drooping flat spikelets an inch long and nearly half an inch wide.....	45 UNIOLA.
44. Spikelets not as above (45).	
45. Flowering glumes 3 to 5 or many-nerved, more or less involute, the upper two or more empty or imperfect.....	43 MELICA.
45. Flowering glumes 5 to many-nerved, the upper one empty (46).	
45. Flowering glumes 3 or one-nerved (47).	
46. Flowering glumes rigidly membranaceous or subcoriaceous, faintly many-nerved, much compressed and keeled; spikelets many-flowered dioecious,	46 DISTICHLIS.
46. Flowering glumes 5-7-nerved, often with a few loose or webby hairs at base; spikelets somewhat compressed, usually 2-5-flowered.....	48 POA.
46. Flowering glumes obtuse, more or less denticulate at the apex, not keeled but rounded on the back, 5 to 9-nerved, the nerves separate and all vanishing before reaching the apex; spikelets terete or flattish.....	49 GLYCERIA.
46. Flowering glumes narrow, rounded on the back, more or less distinctly 3-5-nerved, acute or tapering into a straight awn.....	50 FESTUCA.
46. Flowering glumes rounded on the back or compressed and keeled, 5-9-nerved, acute or awned from below the mostly 2-cleft apex, grain adhering to the palet.....	51 BROMUS.
47. Second glume broadly obovate, shorter than the spikelet, not keeled, 3-nerved	41 EATONIA.
47. Second glume not broadly obovate (48).	
48. Flowering glumes not keeled but rounded on the back, (at least below,) the palet broad (49).	
48. Flowering glumes keeled (50).	

49. Flowering glumes broadly ovate, rigidly coriaceous, the 3 nerves prominent and uniting to form a pointed tip, stamens 2.....**44** DIARRHENA.
49. Flowering glumes not as above, either cuspidate, or 3-toothed or erose; stamens 3.....**37** TRIODIA.
50. Spikelets narrow, sessile or nearly so, more or less distant on the long branches of the panicle, usually in 2 rows.....**39** DIPLACHNE.
50. Spikelets 3-5-flowered, numerous in a dense spike-like cylindrical or interrupted panicle.....**42** KOELERIA.
50. Spikelets pedicellate or sessile, but not as above (51).
51. Spikelets usually many-flowered, palea shorter than the glume, often persisting after the grain and glume have fallen away.....**40** ERAGROSTIS.
51. Spikelets ovate, 3-5-flowered; palea longer than its glume, of nearly the same texture, bidentate, folded lengthwise in the middle and with the two keels folded in the opposite direction.....**38** REDFIELDIA.
52. Culm with a single, uniform, cylindrical (or oval) spike or spike-like panicle (53).
52. Not as above (58).
53. Bristles below the spikelets (54).
53. No bristles present (55).
54. One or sometimes 2 small scales or bristles below the flower, spike ovoid.....**10** PHALARIS.
54. Conspicuous bristles below the spikelets, spike cylindrical.....**6** SETARIA.
55. Flowering glume terminating in a trifid awn, or apparently 3-awned.....**12** ARISTIDA.
55. Awns absent or not trifid (56).
56. Outer glumes long-awned from the apex.....**20** POLYPOGON.
56. Outer glumes acute (57).
57. Glumes 4, none of them awned.....**10** PHALARIS.
57. Glumes 6, second pair awned on the back.....**11** ANTHOXANTHUM.
58. Outer glumes hairy, a peculiar cup-like or annular swelling of the pedicel just below the spikelet.....**4** ERIOCHLOA.
58. Not as above (59).
59. Swamp grasses, 7 to 12 feet tall, leaves very broad and long, panicle large terminal.....**36** PHRAGMITES.
59. Not as above (60).
60. Awns trifid, or apparently 3 awns.....**12** ARISTIDA.
60. Awns absent or not trifid (61).
61. Glumes (including palea) only 2; flowers monoecious.....**8** ZIZANIA.
61. Glumes (including palea) 6, second pair awned on the back.....**11** ANTHOXANTHUM.
61. Glumes (including palea), the normal number (62).
62. Flowering glume coriaceous, rigid, involute with a simple twisted awn from the apex.....**13** STIPA.
62. Flowering glume not as above (63).
63. Spikelets solitary at each joint of the slender triangular rachis of the paniculate spikes, and partly immersed in an excavation.....**30** SCHEDONNARDUS.
63. Spikelets not as above (64).
64. Flowering glume hardened, often with a sharp-pointed and bearded pedicel at the base, awn twisted.....**13** STIPA.
64. Flowering glume awned, but not as above (65).
64. Flowering glume not awned (73).
65. Spikelets sessile and remotely alternate, on long and filiform branches of the panicle, each with one, or rarely 2 perfect flowers, and with a bristle-like rudiment or an awn-like pedicel.....**29** GYMNOPOGON.
65. Not as above (66).
66. Palea ciliate on the apex and keels, lateral nerves of the outer glumes vanishing within the scarious margin.....**43** MELICA.
66. Palea rigid, broad, stamens 2, grain very large, larger than the flower; flowering glume pointed, but not really awned.....**41** DIARRHENA.
66. Palea only one-nerved, stamen one, flowering glume awned near the apex.....**21** CINNA.
66. Palea not as above (67).

67. Flowers in simple or paniculate spikes, spikelets in pairs (one pedicillate) in the alternate notches of the rachis.....	2	ANDROPOGON.
67. Flowers not as above (69).		
68. Spikelets in a simple racemose panicle, outer glumes minute, the upper about half a line long, palet hyaline and bifid at the apex.....	16	BRACHYELYTRUM.
68. Not as above (69).		
69. Spikelets one-flowered, with a bristle-like or pedicillate hairy rudiment opposite the palet.....	23	CALAMAGROSTIS.
69. Not as above (70).		
70. Palet about as long as the flowering glume, and of the same texture.....	15	MUHLENBERGIA.
70. Palet shorter than the flowering glume, or wanting (71).		
71. Inflorescence in simple or paniculate spikes.....	2	ANDROPOGON.
71. Inflorescence paniculate (72).		
72. Spikelets one-flowered, flowering glume awned on the back.....	22	AGROSTIS.
72. Fertile spikelets one-flowered, sessile between two pedicillate sterile spikelets at the end of the slender branches of the panicle.....	2	ANDROPOGON.
73. Palet ciliate on the keel and apex, the lateral nerves of the outer glumes vanishing within the scarious margin.....	43	MELICA.
73. Palet (and glumes) sparingly ciliate, hyaline, glumes with hyaline margins.....	2	ANDROPOGON.
73. Palet not as above (74).		
74. Lower glume narrow-keeled, the second broadly obovate not keeled, 3-nerved, scarious-margined, flowering glumes oblong.....	41	EATONIA.
74. Lower glume narrow, the second ovate, 5-nerved, keeled, flowering glumes broadly ovate, rigidly coriaceous.....	44	DIARRHENA.
74. Not as either of the above (75.)		
75. Flowers with a tuft of hairs at base (76).		
75. Flowers destitute of a tuft of hairs (77).		
76. Outer glumes nearly equal, rigid, 5-nerved, palet sulcate between the keels.....	24	AMMOPHILA.
76. Outer glumes unequal, thinly membranaceous, palet 2-toothed.....	23	CALAMAGROSTIS.
77. The perfect flower of the spikelet closed coriaceous or cartilaginous, stigmas usually purple.....	5	PANICUM.
77. Flower not as above (78).		
78. Palet shorter than the flowering glume, frequently reduced to a small scale or wanting, outer glumes nearly equal or the lower rather longer.....	22	AGROSTIS.
78. Palet about equaling the flowering glume; and of the same texture (79).		
79. Flowering glume with a very short usually hairy callus, mucronate or awned, outer glumes from small or minute to nearly as large as the flowering glume, persistent, sometimes bristle-pointed.....	15	MUHLENBERGIA.
79. Flowering glume destitute of a callus and unawned, outer glumes unequal, the lower one shorter, often acute, but really unawned.....	19	SPOROBOLUS.
80. Spikelets with one terminal perfect flower, the flowering glume more or less concave, becoming indurated, embracing the short palet, which is of the same texture.....	3	PASPALUM.
80. Spikelets with one perfect terminal flower, and usually a second (staminate or rudimentary) one below, glume of the terminal flower with its palet usually of a coriaceous texture.....	5	PANICUM.

1. TRIPSACUM L.

a. Spikes 4 to 8 inches long, at the summit and from upper sheaths.....	1
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1.* *Tripsacum dactyloides* L.; Gama grass, Sesame grass.

2. ANDROPOGON L.

a. Panicle terminal and narrowly oblong (6-12 inches), yellowish or russet.....	9
a. Peduncle solitary, bearing a single spike.....	2
a. Spikes more numerous (b).	
b. Culms bushy — branched at summit, spikes in thick, leafy clusters.....	4
b. Culms, etc., not as above (c).	

* The species, with corresponding numbers, also descriptions, are given in "The Native Grasses of Kansas," in the Quarterly Report of the State Board of Agriculture, March, 1889.

- c. Spikes 1 in. long, 2 or 3 together, in distant clusters, shorter than bracts..... 8
- c. Spikes 1-2 inches long, slender, single and scattered, not as above..... 3
- c. Spikes in pairs or clustered, or digitate (d).
- d. Stamens 3, spikes digitate, hairs short and sparse..... 5
- d. Like the above, but glaucous, villous with white or yellowish hairs..... 6
- d. Fert. fl. with 1 stamen, spikes in pairs or fours, hairs long, white, dense..... 7

2. *Andropogon tener* Kunth.; Broom grass.

3. *A. scoparius* Mx.; Little Blue Stem, Wood grass, Broom grass.

4. *A. macrourus* Mx.; Heavy-topped Broom grass.

5. *A. provincialis* Lam.; Big Blue Stem, Broom grass.

6. *A. Hallii* Hack.; Hall's Broom grass.

7. *A. saccharoides* Swz.; Broom grass.

8. *A. Virginicus* L.; Broom grass.

9. *A. nutans* L.; Wood grass, Indian grass, Bushy Blue Stem.

3. PASPALUM L.

- a. Spikelets two-rowed (b).
- a. Spikelets four-rowed, dense, orbicular, and obtuse..... 10
- b. Spikes with a thin and keeled rachis with incurved margins..... 11
- b. Spikes not as above (c).
- c. Spikelets $\frac{1}{2}$ line wide, narrowly two-rowed..... 12
- c. Spikelets over one line wide, broadly two-rowed..... 13
- 10. *Paspalum virgatum* L.
- 11. *P. fluitans* Kunth.; Marsh Paspalum.
- 12. *P. setaceum* Mx.; slender Paspalum.
- 13. *P. laeve* Mx.; smooth Paspalum.

4. ERIOCHLOA H. B. K.

- a. Stem erect, the nodes and stem above pubescent..... 14
- 14. *Eriochloa punctata* Hamilt.

5. PANICUM L.

- a. Spikes mostly digitate, flat, one-sided (b).
- a. Spikelets imbricate-spiked, panicle simple or comp., often with stiff hairs (c).
- a. Spikelets scattered, in panicles (d).
- b. Spikelets ovoid, about 1 line long, second glume equaling the flower..... 15
- b. Spikelets oblong, about $1\frac{1}{2}$ lines long, second glume $\frac{1}{2}$ length of flower..... 16
- c. Panicle dense, spikes 1-3 inches long, more or less compound..... 31
- c. Panicle slender, its branches simple, the perfect flower less pointed; resembles small and smooth forms of the last..... 32
- d. Panicle small, narrow, branches few, erect (e).
- d. Panicle small but diffuse, oval or oblong (f).
- d. Panicle larger, oval or oblong (g).
- d. Panicle effuse, branches capillary and much subdivided (j).
- d. Panicle ample and diffuse; tall grasses (l).
- e. Lvs. 5-10 lines wide, strongly 9-11 nerved, margin scabrous..... 26
- e. Lvs. erect, narrowly linear, sheaths usually pubescent..... 30
- f. Spikelets $\frac{3}{4}$ -1 line long; plant very variable..... 29
- f. Spikelets $1\frac{1}{2}$ - $1\frac{3}{4}$ lines long; also variable..... 28
- g. Velvety-downy all over, except a narrow ring below each node..... 27
- g. Smooth or hairy, but not as above (h).
- h. Lvs. broadly lanceolate from a cordate base, 3-4 in. long, $\frac{3}{4}$ -1 in. wide..... 23
- h. Lvs. 4-8 inches long, lanceolate or oblong-lanceolate (i).
- i. Spikelets oval, five-eighths of a line long, culms stout, smooth..... 25
- i. Spikelets oblong-ovate to obovate, $1\frac{1}{2}$ lines long, culms rigid, leafy to top..... 24
- j. Panicle $\frac{1}{2}$ - $\frac{3}{4}$ length of culm, culm erect or decumbent below (k).
- j. Panicles terminal and lateral, culms decumbent, stout, sheaths flattened..... 19
- k. Panicles $\frac{1}{2}$ - $\frac{3}{4}$ length of plant, much branched, sheaths very hairy..... 20
- k. Panicle $\frac{1}{2}$ - $\frac{1}{2}$ length of plant, very effuse, capillary branches long, sparingly divided..... 21
- l. Panicles terminal and lateral (m).
- l. Panicles terminal only, 6-18 in. long, culm 3-6 ft. high..... 22

<i>m.</i> Culms erect, 2-4 ft. high; root perennial (<i>n</i>).	
<i>m.</i> Culms geniculate at the decumbent or procumbent base; annual.....	19
<i>n.</i> Culms stout, much branched above, spikelets racemose, crowded, mostly one-sided.....	18
<i>n.</i> Culms less stout, apex of spikelets a little curved.....	17

15. *Panicum glabrum* Gaud.; smooth Panic grass.
16. *P. sanguinale* L.; Crab grass; Finger grass.
17. *P. anceps* Mx.; two-edged Panic grass.
18. *P. agrostoides* Spreng.; red-top Panic grass.
19. *P. proliferum* Lam.; branching Panic grass.
20. *P. capillare* L.; Old Witch grass; hair-stalked Panic grass.
21. *P. autumnale* Bosc.; Autumn Panic grass.
22. *P. virgatum* L.; Switch grass.
23. *P. latifolium* L.; Broad-leaved Panic grass.
24. *P. clandestinum* L.; Panic grass.
25. *P. microcarpon* Muhl.; Panic grass.
26. *P. xanthophysum* Gr.; Panic grass.
27. *P. viscidum* Ell.; Panic grass.
28. *P. scoparium* Lam.; Panic grass.
29. *P. dichotomum* L.; Panic grass.
30. *P. depauperatum* Muhl.; Panic grass.
31. *P. Crus-galli* L.; Barnyard grass.
32. *P. colonum* L.; Panic grass.

6. SETARIA Beauv.

<i>a.</i> Bristles in clusters, roughened or barbed upwards (<i>b</i>).	
<i>a.</i> Bristles single or in pairs, roughened or barbed downwards.....	33
<i>b.</i> Spike tawny yellow, bristles 6-11, perfect flower wrinkled.....	34
<i>b.</i> Spike green, bristles few, perfect flower less distinctly wrinkled.....	35
33. <i>Setaria verticillata</i> Beauv.; Fox-tail grass.	
34. <i>S. glauca</i> Beauv.; Yellow Fox-tail.	
35. <i>S. viridis</i> Beauv.; Green Fox-tail, Pigeon grass, Bottle grass.	

7. CENCHRUS L.

<i>a.</i> Stems branched and ascending, the fruit a pestiferous bur.....	36
36. <i>Cenchrus tribuloides</i> L.; Sand-bur, Hedgehog grass.	

8. ZIZANIA L.

<i>a.</i> Upper branches of panicle erect pistillate, lower spreading staminate.....	37
37. <i>Zizania aquatica</i> L.; Wild Rice, Indian Rice, Water Oats.	

9. LEERSIA Swartz.

<i>a.</i> Spikelets narrowly oblong, somewhat crowded (<i>b</i>).	
<i>a.</i> Spikelets broadly oval, imbricately covering each other.....	40
<i>b.</i> Panicle simple, spikelets $1\frac{1}{2}$ lines long, stamens two.....	38
<i>b.</i> Panicle diffusely branched, spikelets $2\frac{1}{2}$ -3 lines long, stamens three.....	39
38. <i>Leersia Virginica</i> Willd.; White grass.	
39. <i>L. oryzoides</i> Swz.; Cut grass, White grass, False Rice.	
40. <i>L. lenticularis</i> Mx.; Fly-catch grass.	

10. PHALARIS L.

<i>a.</i> Panicle dense spike-like, oval or oblong (<i>b</i>).	
<i>a.</i> Panicle branched, the clusters open in anthesis.....	43
<i>b.</i> Spike oval, culm one to two feet high.....	41
<i>b.</i> Spike oblong, 1-2 (or more) inches long, culm taller.....	42
41. <i>Phalaris Canariensis</i> L.; Canary grass.	

42. *P. intermedia* Bosc.; Southern Reed-Canary grass, California Timothy.

43. *P. arundinacea* L.; Reed-Canary grass.

11. ANTHOXANTHUM L.

a. Culms slender; very sweet-scented in drying..... 44

44. *Anthoxanthum odoratum* L.; Sweet Vernal grass.

12. ARISTIDA L.

a. Awns separate to the base, not jointed with the glume (b).

a. Awns jointed with the glume below their junction..... 50

b. Awns very unequal, the elongated middle one bent (c).

b. Awns all diverging and alike, or lateral ones but little shorter (e).

c. Outer glumes 9-10 lines long, 3-5-nerved..... 45

c. Outer glumes 3-4 lines long, carinately 1-nerved (d).

d. Lateral awns 6-7 lines long, middle one 10-12 lines..... 47

d. Awns much shorter: culms much branched throughout..... 46

e. Panicle spiked, 10-18 inches long (f).

e. Panicle loosely few-flowered, at most 6 inches long (g).

f. Awns much longer than the flower, middle one about one inch..... 52

f. Awns about the length of the flower, 6 lines or shorter..... 48

g. Stems simple, 6-15 inches high, panicle 3-6 inches long, awns long or short, outer glumes purplish..... 49

g. Stems tufted, low, awns capillary exceeding the slender flower, 1½-3 inches long..... 51

45. *Aristida ramosissima* Englm.; Triple-awned grass.

46. *A. dichotoma* Mx.; Beard grass, Three-awned grass.

47. *A. gracilis* Ell.; Beard grass, Three-awned grass.

48. *A. stricta* Mx.; Beard grass, Three-awned grass.

49. *A. purpurea* Nutt.; Beard grass, Three-awned grass.

50. *A. desmantha* Trin.; Beard grass, Three-awned grass.

51. *A. oligantha* Mx.; Beard grass, Three-awned grass.

52. *A. purpurascens* Poir.; Tall Beard grass, Triple-awned grass.

13. STIPA L.

a. Awns 4-7 inches long, panicle more or less contracted (b).

a. Awns 2-3 inches long, panicle open..... 53

a. Awns 1-1½ inches long, panicle narrow, loose, long..... 55½

b. Panicle loose, 8-12 inches long..... 54

b. Panicle narrow and contracted, base of grain more pointed..... 55

53. *Stipa avenacea* L.; Black Oat grass.

54. *S. comata* Trin. & Rupr.; Porcupine grass, Feather grass.

55. *S. spartea* Trin.; Porcupine grass, Feather grass.

55½. *S. Viridula* Trin.; Bunch Grass, Porcupine grass.

14. ORYZOPSIS Mx.

a. Awn thrice the length of the blackish flowering glume..... 56

56. *Oryzopsis melanocarpa* Muhl.; Mountain rice.

15. MUHLENBERGIA Schreb.

a. Panicles contracted or glomerate (b).

a. Panicles very loose and open, the long branches capillary..... 64

b. Flowering glumes barely mucronate or sharp-pointed (c).

b. Flowering glumes bristle-awned from the tip (c).

c. Outer glumes awnless but pointed (d).

c. Outer glumes awned, panicle oblong-linear, spike-like..... 58

d. Culms rarely branching, 1-2 ft. high, panicle simple, very slender..... 57

d. Culms much branched, 2-3 ft. high, panicles lateral and terminal, linear..... 59

e. Floret with an oblique callus bearing hairs as long as the floret..... 61

e. Not as above (f).

- f. Outer glumes bristle-pointed, nearly as long as the flowering glume..... 60
- f. Outer glumes short-pointed, half the length of the flowering glume..... 62
- f. Outer glumes extremely minute, the lower obsolete; culms much-branched..... 63
- 57. *Muhlenbergia sobolifera* Trin.
- 58. *M. glomerata* Trin.; Spiked Muhlenbergia.
- 59. *M. Mexicana* Trin.; Mexican Muhlenbergia.
- 60. *M. sylvatica* T. & G.; Wood grass.
- 61. *M. comata* Benth.; Woolly Muhlenbergia.
- 62. *M. Willdenovii* Trin.; Willdenows Muhlenbergia.
- 63. *M. diffusa* Schr.; Nimble Will, Wire grass.
- 64. *M. capillaris* Kunth.; Hair grass.

16. BRACHYELYTRUM Beauv.

- a. Culms 1-3 ft. high, creeping root-stocks, downy sheaths..... 65
- 65. *Brachyelytrum aristatum* Beauv.; Short-glumed grass.

17. PHEUM L.

- a. Spike cylindrical elongated, outer glumes ciliate and bristle-pointed..... 66
- 66. *Phleum pratense* L.; Timothy, Herd's grass, Cat's-tail grass.

18. ALOPECURUS L.

- a. Stems upright, $\frac{1}{2}$ -2 feet high (b).
- a. Stems decumbent, bent at the lower joints (c).
- b. Stems $\frac{1}{2}$ -2 feet high, outer glumes with long hairs on the back..... 67
- b. Stem about 2 feet high, awn exerted more than half its length..... 68
- c. Awn from (near base of) outer glume projecting half its length 69
- c. Like the last, but glaucous, and awn shorter and arising higher..... 70
- 67. *Alopecurus alpinus* Sm.; Alpine Fox-tail.
- 68. *A. pratensis* L.; Meadow Fox-tail.
- 69. *A. geniculatus* L.; Water Fox-tail.
- 70. *A. aristulatus* Mx.; Short-bearded Fox-tail.

19. SPOROBOLUS R. Br.

- a. Panicles spiked or contracted (b).
- a. Panicles generally open (g).
- b. Outer glumes very unequal (c).
- b. Outer glumes somewhat equal (d).
- c. Culms $1\frac{1}{2}$ -4 feet high, leaves long (d).
- c. Culms (6-12 inches high) and leaves very slender, root perennial..... 74
- d. Spikelets 2-3 lines long, lowest leaves rigid, rough on edges..... 72
- d. Spikelets less than one line long, narrow, lowest glume obtuse or truncate..... 71
- e. Root annual, culms ascending, grain linear..... 73
- e. Root perennial (f).
- f. Outer glumes very acute, flowering glume cuspidate..... 74
- f. Outer glumes obtuse, panicle of few solitary distant erect rays..... 75
- g. Outer glumes purplish, very unlike, upper ovate, grain round 76
- g. Not as above (h).
- h. Rays of panicle verticillate, 8 (or more) at base, fewer above..... 79 $\frac{1}{2}$
- h. Rays of panicle in pairs or solitary (i).
- i. Outer glumes very unequal (j).
- i. Outer glumes nearly equal, stems 6-15 inches, branched or decumbent..... 79
- j. Rays of panicle flower-bearing to base, sheaths strongly-bearded at throat..... 77
- j. Rays naked below, sheaths with a few long hairs at throat..... 78
- 71. *Sporobolus Indicus* R. Br.; Smut grass.
- 72. *S. asper* Kunth.; Rough Drop-seed grass.
- 73. *S. vaginaeflorus* Torr.; Drop-seed grass.
- 74. *S. cuspidatus* Torr.; Drop-seed grass.

75. *S. depauperatus* Torr.; Drop-seed grass.
 76. *S. heterolepis* Gr.; Drop-seed grass.
 77. *S. cryptandrus* Gr.; Drop-seed grass.
 78. *S. airoides* Torr.; Salt grass, Drop-seed grass.
 79. *S. asperifolius* N. & M.; Drop-seed grass.
 79½. *S. Arkansana* (Trin.); Drop-seed grass.

20. POLYPOGON Desf.

- a.* Panicle dense, soft, yellowish-green; awns conspicuous, long..... 80
a. Panicle narrow, much-lobed, usually purplish; awns shorter..... 81
 80. *Polypogon Monspeliensis* Desf.; Annual Beard-grass.
 81. *P. littoralis* Sm.; Perennial Beard-grass.

21. CINNA L.

- a.* Panicle rather dense, branches spreading in flower, spikelets 2½-3 lines long..... 82
a. Panicle loose and more slender, branches drooping in flower, spikelets 1½-2 lines long..... 82½
 82. *Cinna arundinacea* L.; Wood Reed grass.
 82½. *C. pendula* Trin.; Wood Reed grass.

22. AGROSTIS L.

- a.* Palet present (*b.*)
a. Palet entirely wanting or very minute (*c.*)
b. Ligule short and truncate; panicle slender, usually spreading in flower..... 83
b. Ligule long and acute, panicle as above..... 83½
b. Ligule obtuse, flowering glume with a longitudinal furrow on back..... 84
c. Culms firm or stout, 2-3 ft. high; upper ligules 2-3 lines long..... 85
c. Culms slender or very slender, 1-2 feet high (*d.*)
d. Stems slender, panicle pale-green, branches fl.-bearing from or below the middle..... 86
d. Stems very slender, panicle purplish, branches fl.-bearing at or near apex..... 87
 83. *Agrostis vulgaris* With.; Red-Top, Fine-Top, Borden's grass, Bent grass.
 83½. *A. alba* L.; Fiorin, White Bent grass, Red-Top.
 84. *A. exarata* Trin.; Northern Red-Top, Mountain Red-Top.
 85. *A. elata* Trin.; Bent grass.
 86. *A. perennans* Tuck.; Thin grass, Bent grass.
 87. *A. scabra* Willd.; Hair grass.

23. CALAMAGROSTIS Roth.

- a.* Awn delicate, straight, not exceeding the hairs..... 88
a. Awn bent or twisted when dry, surpassing the flowering glume..... 89
 88. *Calamagrostis Canadensis* Beauv.; Small Reed-grass, Blue-Joint.
 89. *C. confinis* Nutt.; Reed Bent-grass.

24. AMMOPHILA Host.

- a.* Culms 3-6 ft. high, panicle 4-16 inches long, palet equal and similar to glume..... 90
 90. *Ammophila longifolia* Vasey; Long-leaved Reed grass.

25. DESCHAMPSIA Beauv.

- a.* Awn slender, about as long as fl.-glume, culm 2-4 feet high..... 91
a. Awn about half longer, becoming bent and twisted, culm 1½-2 ft..... 92
 91. *Deschampsia flexuosa* Griseb.; Wood Hair grass.
 92. *D. caespitosa* Beauv.; Hair grass.

26. DANTHONIA DC.

- a.* Culms tufted, low, spikelets few, 3-5 lines long..... 93
 93. *Danthonia spicata* Beauv.; Spiked Wild Oat grass.

27. SPARTINA Schreb.

- a. Culm 3-6 (or more) feet high, leaves 2-4 feet long..... 94
 a. Culm 1-2 feet high, slender, leaves narrow and rush-like..... 95
 94. *Spartina cynosuroides* Willd.; Cord grass, Marsh grass.
 95. *S. juncea* Willd.; Marsh grass, Salt grass, Rush Salt grass.

28. CHLORIS SWZ.

- a. Culm compressed, branched at base, spikes filiform..... 96
 96. *Chloris verticillata* Nutt.

29. GYMNOPOGON Beauv.

- a. Flowers on long filiform spikes crowded into a raceme..... 97
 97. *Gymnopogon racemosus* Beauv.; Naked Beard grass.

30. SCHEDONNARDUS Steud.

- a. Panicle consisting of slender, naked, triangular spikes..... 98
 98. *Schedonnardus Texanus* Steud.; Texas Spike grass.

31. BOUTELOUA Lag.

- a. Spikes pectinate oblong or linear, solitary or few, in a raceme (b).
 a. Spikes short, in a long virgate one-sided spike or raceme..... 101
 b. Glumes with dark, warty glands and bristly hairs, sterile flower glabrous..... 99
 b. Glumes soft, hairy, pedicel of sterile flower villous-tufted..... 100
 99. *Bouteloua hirsuta* Lag.; Bristly Mesquite, Gramma grass.
 100. *B. oligostachya* Torr.; Mesquite grass, Gramma grass.
 101. *B. racemosa* Lag.; Tall Gramma grass.

32. ELEUSINE Gaert.

- a. Spikes digitate, spikelets on one side of a flattish rachis..... 102
 102. *Eleusine Indica* Gaert.; Yard grass, Crow-foot, Crab grass, Wire grass.

33. LEPTOCHLOA Beauv.

- a. Flowers in a long, paniced raceme, spikes slender, numerous..... 103
 103. *Leptochloa mucronata* Kth.; Feather grass, Slender grass.

34. BUCHLOË Englm.

- a. Dioecious, very small, pistillate flowers inconspicuous..... 104
 104. *Buchloe dactyloides* Englm.; Buffalo grass, False Mesquite grass.

35. MUNROA Torr.

- a. Flowers in leafy heads or clusters; stems rigid, creeping..... 105
 105. *Munroa squarrosa* Torr.; False Buffalo grass.

36. PHRAGMITES Trin.

- a. A very tall swamp grass, with a large terminal panicle..... 106
 106. *Phragmites communis* Trin.; Reed grass.

37. TRIODIA R. Br.

- a. Panicle large purplish, loose; spikelets lanceolate..... 107
 a. Panicle contracted, 3-5 inches long; spikelets few, ovate, turgid..... 108
 a. Panicle spike-like, dense, 6 in. long, $\frac{1}{2}$ in. wide; spikelets nearly as broad..... 109
 a. Panicle dense and ovoid or very simple and of few spikelets (b).
 b. Stems with usually a single node, panicle ovoid, 1-2 inches long..... 110
 b. Stems with numerous bearded joints, panicles very simple, axillary ones included..... 111
 107. *Triodia cuprea* Jacq.; Tall Red-Top.

108. *T. ambigua* Vasey.
 109. *T. stricta* Vasey.
 110. *T. acuminata* Vasey.
 111. *T. purpurea* Vasey; Sand grass.

38. REDFIELDIA Vasey.

- a. Culms flexuous, leaves rigid, panicles lax..... 112
 112. *Redfieldia flexuosa* Vasey.

39. DIPLACHNE Beauv.

- a. Panicle 6-10 inches long, with 15-30 branches, flowering throughout..... 113
 a. Panicle erect, stiff, 1-2 feet long, with numerous spreading spike-like branches..... 114
 113. *Diplachne fascicularis* Beauv.; Spike grass.
 114. *D. rigida* Vasey; Spike grass.

40. ERAGROSTIS Beauv.

- a. Stems erect or diffusely spreading and ascending (b).
 a. Prostrate and creeping, spikelets clustered, linear lanceolate, 10-30-flowered..... 115
 b. Culms branching and decumbent or spreading at base, panicle narrow (c).
 b. Culms simple or branching only at base, rigid, erect, panicle very large (f).
 c. Spikelets mostly large, 4-9 lines long, 10-20-flowered (d).
 c. Spikelets mostly small, 1-4½ lines long, 2-18-flowered (e).
 d. Panicle oblong or pyramidal, full-flowered, spikelets oblong or lanceolate, 3-6 lines long..... 116
 d. Panicle 4-6 inches high, narrow, spikelets 4-9 lines long, leaves becoming involute..... 120
 e. Spikelets 5-12-flowered, 2-4 lines long, about equaling their pedicels..... 117
 e. Spikelets 2-5-flowered, 1-1½ lines long, on slender pedicels..... 118
 e. Spikelets 5-18-flowered, 2-4½ lines long, mostly shorter than pedicels..... 119
 f. Panicle 1-2½ feet long, virgate, very loose, leaves 1½-2 feet long..... 120½
 f. Panicle widely expanding and diffuse (g).
 g. Panicle mostly naked in axils, spikelets 2-4-flowered, very small 121
 g. Bearded in the axils, spikelets 5-15-flowered, large, 2-3 lines long..... 122
 115. *Eragrostis reptans* Nees.; Creeping Eragrostis.
 116. *E. major* Host.; Stinking grass, Pungent Meadow grass, Candy grass.
 117. *E. pilosa* Beauv.
 118. *E. Frankii* Mey.
 119. *E. Purshii* Schrad.
 120. *E. oxylepis* Torr.
 120½. *E. tenuis* Gray.
 121. *E. capillaris* Nees.
 122. *E. pectinacea* Gray.

41. EATONIA Raf.

- a. Panicle dense and contracted, second glume broad and saccate..... 123
 a. Panicle long and slender, loose, second glume not so broad..... 124
 123. *Eatonia obtusata* Gr.; Obtuse Eatonina, Prairie grass.
 124. *E. Pennsylvanica* Gr.; Eastern Eatonina, Prairie grass.

42. KOELERIA Pers.

- a. Panicle narrowly spiked, interrupted or lobed at the base..... 125
 125. *Koeleria cristata* Pers.; Crested Koeleria, Prairie grass.

43. MELICA L.

- a. Panicle simple or little branched..... 126
 a. Panicle larger and more branched..... 126½
 126. *Melica mutica* Walt.; Melic grass.
 126½. *M. mutica* Walt., var. *diffusa* Gr.; Melic grass.

44. DIARRHENA Raf.

- a. Simple culm with long, linear-lanceolate flat leaves at base..... 127
127. *Diarrhena Americana* Beauv.

45. UNIOLA L.

- a. The very broad, flat spikelets on drooping pedicels..... 128
128. *Uniola latifolia* Mx.; Broad-flowered Fescue grass.

46. DISTICHLIS Raf.

- a. Leaves rigid and sharp-pointed, glumes many-nerved, coriaceous..... 129
129. *Distichlis maritima* Raf.; Salt grass, Marsh grass.

47. DACTYLIS L.

- a. Upper branches of panicle short, lower, longer and spreading..... 130
130. *Dactylis glomerata* L.; Orchard grass, Cock's-foot grass.

48. POA L.

- a. Flowering glumes compressed-keeled, acute (c).
a. Flowering glumes rounded on the back, obtuse (b).
b. Spikelets 3-7-flowered, outer glumes acute, rough on the back..... 131
b. Spikelets mostly 3-flowered, outer glumes very acute, rough on the mid-nerve..... 132
c. Low and spreading, 3-6 in. high, from an annual or biennial root, flaccid..... 133
c. Culms 6-20 in. long, geniculate-ascending, rigid, very much flattened..... 134
d. Spikelets mostly numerous, and crowded on rather short, rough branches (e).
d. Spikelets fewer and more scattered on slender pedicels, flowering early (f).
e. Ligules elongated, flowering glume very obscurely nerved, spikelets narrow..... 135
e. Ligules short and blunt, flowering glume 5-nerved, hairy along the margin and keel..... 136
e. Ligules oblong, acute, flowering glume prominently 5-nerved, naked at the margins..... 137
f. Spikelets 3-4 lines long, flowering glume conspicuously scarious-tipped 140
f. Spikelets 1-2 lines long, flowering glume scarcely scarious-tipped (g).
g. Flowers oblong, obtuse, branches of panicle in fives or more..... 138
g. Flowers and glumes acute, branches of panicle in threes or fours..... 139
131. *Poa andina* Nutt.; Mountain Spear grass.
132. *P. tenuifolia* Nutt.; Oregon Blue grass.
133. *P. annua* L.; Annual Spear grass, Goose grass.
134. *P. compressa* L.; Wire grass, Blue grass.
135. *P. serotina* Ehr.; Fowl Meadow grass, False Red-Top.
136. *P. pratensis* L.; June grass, Ky. Blue grass, Spear grass, Meadow grass.
137. *P. trivialis* L.; Rough-Stalked Meadow grass.
138. *P. sylvestris* Gr.; Meadow grass, Spear grass.
139. *P. alsodes* Gr.; Tall Blue grass, Wood Spear grass.
140. *P. flexuosa* Muhl.; Meadow grass, Spear grass.

49. GLYCERIA R. Br.

- a. Flowering glume conspicuously nerved, styles present (b).
a. Flowering glume inconspicuously 5-nerved, stigmas nearly sessile..... 145
b. Spikelets linear, $\frac{1}{2}$ inch long, appressed, terete; panicle narrow..... 144
b. Spikelets ovate, oblong, or linear-oblong, 1-3 lines long (c).
c. Spikelets ovate, at length very broad and tumid, 2 lines long..... 141
c. Spikelets very numerous, ovate-oblong, 3-7 flowered, 1-2 lines long..... 142
c. Spikelets oblong, or linear-oblong, 5-9 flowered, about 3 lines long..... 143
141. *Glyceria Canadensis* Trin.; Rattlesnake grass, Tall Quaking grass.
142. *G. nervata* Trin.; Nerved Meadow grass, Nerved Manna grass.
143. *G. aquatica* Sm.; Reed Meadow grass, White Spear grass.
144. *G. fluitans* R. Br.; Floating Manna grass.
145. *G. distans* Wahl.; Manna grass.

50. *FESTUCA* L.

- a. Flowers awned or bristle-pointed (b).
- a. Flowers awnless or nearly so (d).
- b. Awns conspicuous, about equaling or exceeding the flowering glume..... 146
- b. Awns much shorter than the lanceolate flowering glumes (c).
- c. Panicle few-flowered, contracted; spikelets ovate, about 4-flowered..... 147
- c. Panicle oblong, spreading; spikelets nearly terete, 5-7-flowered..... 148
- d. Panicle contracted, with short ascending branches (e).
- d. Panicle very loose, with spreading or reflexed branches (f).
- e. Spikelets 6-9-flowered, 6-9 lines long, leaves a foot long..... 150
- e. Spikelets 2-5-flowered, about 3 lines long, leaves about 8 in. long..... 149
- f. Spikelets 3-5-flowered, 3 lines long; culm 2-4 feet high..... 151
- f. Like the last, but stouter, and spikelets about 5-flowered..... 152
- 146. *Festuca tenella* Willd.; Small Fescue.
- 147. *F. ovina* L.; Sheep's Fescue grass.
- 148. *F. duriuscula* L.; Harsh Fescue grass.
- 149. *F. elatior* L.; Meadow, or Tall Fescue; Randall, or Evergreen grass.
- 150. *F. pratensis* Huds.; Meadow Fescue grass.
- 151. *F. nutans* Willd.; Drooping Fescue.
- 152. *F. Shortii* Kunth.; Short's Fescue.

51. *BROMUS* L.

- a. Lower glume 3-5-nerved, second glume 5-9-nerved (b).
- a. Lower glume 1-nerved, second glume 3-nerved or obscurely 5-nerved..... 158
- b. The awn small or scarcely any (c).
- b. The awn evident or conspicuous (d).
- c. Panicle 6-10 inches long, spikelets 1-1½ inches long..... 153
- c. Panicle 4-6 inches long, spikelets oblong-ovate, turgid..... 154
- d. Awn as long as or longer than the flowering glume (e).
- d. Awn shorter (f).
- e. Spikelets oblong-ovate, turgid, sheaths sometimes hairy..... 155
- e. The conical-ovate spikelets and leaves downy..... 156
- f. Panicle spreading, spikelets of 8-10 rather distant flowers..... 154
- f. Panicle simple, small; spikelets 7-12-flowered, densely silky..... 157
- 153. *Bromus unioloides* Willd.; Schrader's grass, Rescue grass.
- 154. *B. secalinus* L.; Cheat, Chess.
- 155. *B. racemosus* L.; Upright Chess.
- 156. *B. mollis* L.; Soft Chess.
- 157. *B. Kalmii* Gray; Wild Chess.
- 158. *B. ciliatus* L.; Ciliate Chess.

52. *LOLIUM* L.

- a. Spikelets 7-11-flowered, awnless or short-awned..... 159
- 159. *Lolium perenne* L.; Rye grass, Italian Rye grass.

53. *AGROPYRUM* Beauv.

- a. Awn when present not longer than the flowering glume (b).
- a. Flowering glume and sometimes the outer glumes long awned (c).
- b. Culm 2-3 feet high, spike narrow, close, 3-6 inches long..... 160
- b. Like the preceding, but no running root-stocks, spike narrow, slim..... 160½
- b. Like the first, but more rigid and stouter, of a light bluish-green color..... 161
- c. Spike more or less nodding (not strict), awn of flowering glume twice its length..... 162
- c. Spike rigid and strict, awn of flowering glume half or fully its length..... 163
- 160. *Agropyrum repens* Beauv.; Couch, Quick, Quitch, Wheat, Twitch or Dog grass.
- 160½. *A. tenerum* Vasey; Wheat grass, Clump Wheat grass.
- 161. *A. glaucum* R. & S.; Western Wheat grass, Colorado Blue-Joint, Colorado Blue-Stem, Wild Quack grass, Gumbo grass.

162. *A. caninum* Reich.; Wheat grass.
 163. *A. violaceum* Beauv.; Wheat grass.

54. HORDEUM L.

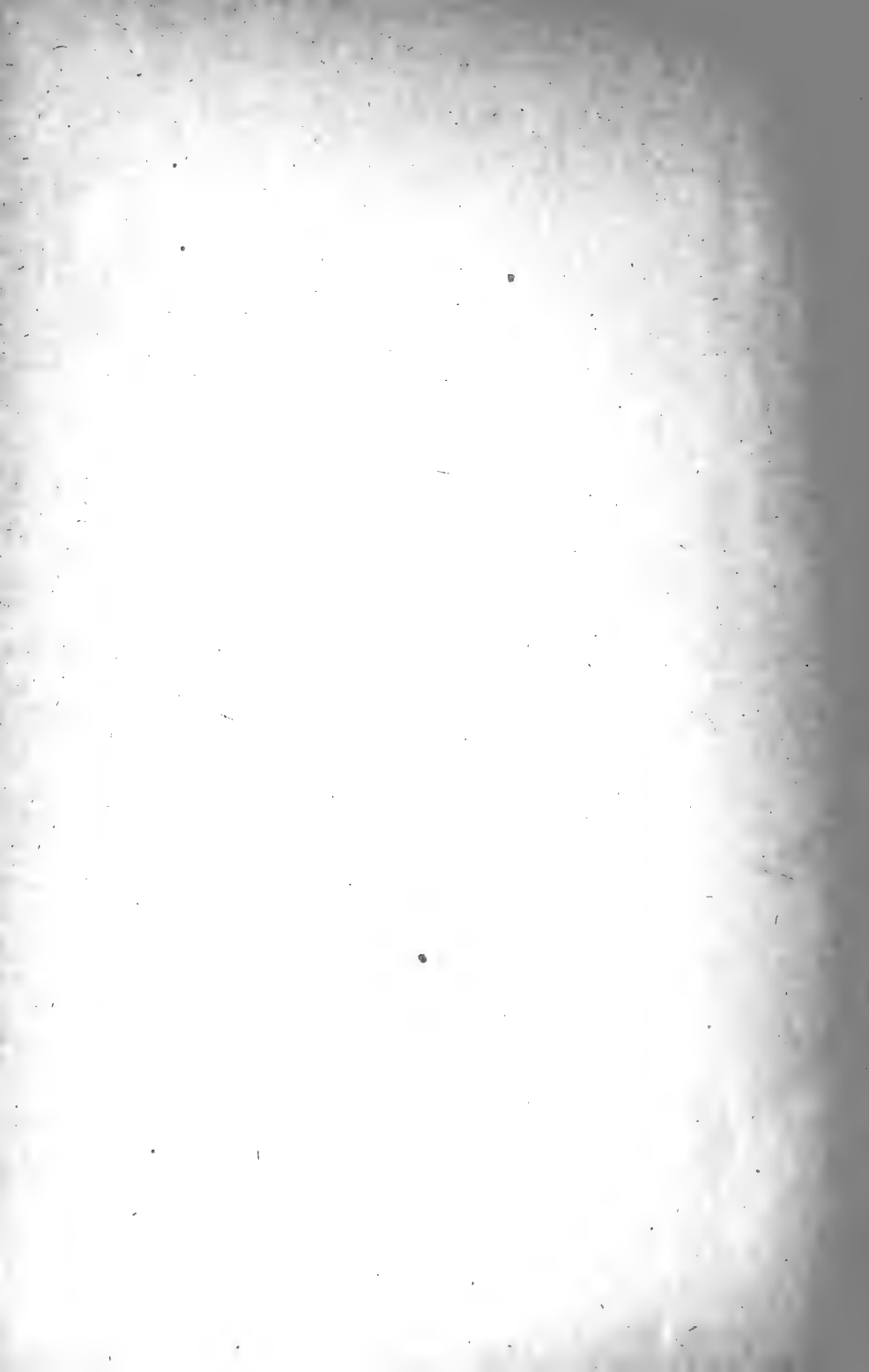
- a. Awns about 2 inches long, spike bushy in appearance..... 164
 a. Awns about $\frac{1}{4}$ -inch long, spike not so bushy..... 165
 164. *Hordeum jubatum* L.: Squirrel-tail grass.
 165. *H. pusillum* Nutt.; Small Squirrel-tail grass.

55. ELYMUS L.

- a. Culms rather tall, 2-5 feet high, outer glumes with short or long awns (b).
 a. Culms about a foot high (seldom 2 ft.), outer glumes long awned..... 169
 b. More or less pubescent, spike usually slender, awn 1 inch long..... 168
 b. Plant (except sometimes the flower) not pubescent (c).
 c. Spike rigidly upright, peduncle short, often included in sheath..... 166
 c. Spike (5-9 in. long) soon nodding, on an exserted peduncle..... 167
 166. *Elymus Virginicus* L.; Wild or Smooth Rye grass, Terrell grass.
 167. *E. Canadensis* L.; Wild Rye, Lyme grass, Terrell grass.
 168. *E. striatus* Schultz; Rye grass, Dennett grass.
 169. *E. Sitanion* Schl.; Rye grass, Small Western Rye grass.

56. ASPRELLA Willd.

- a. Spike loose, 3-6 inches long, spikelets early deciduous..... 170
 170. *Asprella hystrix* Willd.; Bottle-brush grass.



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